UNIVERSITY OF ALBERTA

THE EFFECTS OF A METACOGNITIVE STRATEGIES PROGRAM ON ACADEMIC PERFORMANCE, PERCEIVED SUCCESS AND CONTROL FOR ADULTS RETURNING TO SCHOOL FOR ACADEMIC UPGRADING

BY

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A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

SPECIAL EDUCATION

DEPARTMENT OF EDUCATION PSYCHOLOGY

EDMONTON, ALBERTA

Fall, 1997

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Degree: Doctor of Philosophy

Year this Degree Granted: 1997

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled The Effects of a metacognitive strategies program on academic Performance, Perceived Success and Control for Adults Returning to School for Academic Upgrading submitted by Wendy Wiles in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Special Education.

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I believe that imagination is stronger that Knowledge.

That myth is more potent than history.

That dreams are more powerful than facts.

That hope always triumphs over experience.

That laughter is the only cure for grief.

And I believe that love is stronger than death.

by Rober Fulghum

DEDICATE TO

my father
who always encouraged me to do my best
but never asked for more

to all students
who are returning to school
for academic up-grading

Abstract

The purpose of this study was to investigate the influence and effectiveness of a metacognitive strategies program for adult-upgrading students on their perceived control and perceived success in the academic setting, as well as performance on a reading comprehension or math assessment. As evidenced in the research pertaining to children, academic success has been closely associated with metacognitive awareness, particularly related to perceived control and perceived success. These two areas are considered integral components of attribution, metacognition and adult learning. For educators to be able to assist adults returning to school, it is important to ascertain if metacognitive training indeed changes perceived control and success as well as performance on academic tasks.

This research used a pre/post experimental design. The experimental group was composed of four intact English Cognitive strategies classes as well as two Math Cognitive Strategies classes. Two intact English classes and one intact Math class made up the control group.

The data were collected at a vocational college in a large city in Alberta over two semesters (one school year). During the first semester, data from 135 students were collected to develop and assess the reliability and validity of a Perception of Academic Achievement Scale (PAAS) as well as to gather data for the experimental portion of the assessment. A total of 98 studentds participated in experimental and control groups in order to obtain pre and post data in the area of English and Math.

The PAAS was developed and results of reliability and validity measures lent both theoretical and statistical support for the use of the PAAS in measuring perception of control and perception of success. An interaction was found for

reading comprehension as measured by the Canadian Achievement Test for Adults for the experimental group. The experimental group displayed a distinct trend for greater positive change over time in perception of success as compared to controls in the English area. No significant group differences were observed for perception of control. As well, no significant differences were noted between the experimental and control groups for the math area in any of the variables measured. Educational and research implications are discussed as well as limitations of the study.

Acknowledgments

I wish to express my sincere appreciation to the following people who have been instrumental in assisting with the completion of this research and my studies at the University of Alberta:

To Dr. R. Mulcahy, my advisor and mentor, for his contagious zest for learning, that he so generously shares with his students and colleagues. He provided ongoing encouragement and support for the completion of this research as well as my educational and personal growth.

To Dr. T. O. Maguire for his straight-forwardness during classes and the writing of this dissertation.

To Dr. G. Malicky for her realistic look on life and her willingness to help in all situations. She is a model for all educators.

To Dr. F. Snart for her kindness and concern for students. She was one of the lights in the beginning of graduate school that if it had not shone, I would never had found my way to the completion of a Masters Degree let alone this Doctoral Dissertation.

To Dr. L. Wilgosh for her promptness and professionalism. She is a thorough editor.

To administration and staff at the college for allowing and supporting this research.

To Lois Bredo for her continued support and encouragement. She provided a model of continuing strength and optimism when things looked bleak.

To Family Dave, Brett, Josh, and Lauren without whose help I could not have carried out life to any degree of success either at home or at university.

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Chapter I

INTRODUCTION

Adults who are returning to school for academic upgrading are of concern to researchers and professionals in the field of education as well as society as a whole. Many of these adults are returning to school at the expense of the government. Others are paying for their education. It is in everyone's best interest that they receive appropriate instruction to aid in their success. In order to meet success, many variables must be considered. Among the most critical are the students' goals, expectations, motivation, attribution, and cognitive and metacognitive skills. The purpose of this study was to investigate the influence and effectiveness of a metacognitive strategies program for adult-upgrading students on their perceived success and perceived control in the academic setting as well as performance on a reading comprehension or mathematics assessment.

Recently, attributional beliefs have been incorporated into the study of metacognition. Both the variables of control of one's learning and beliefs of ones' ability to succeed are included in metacognition. It has been established that one's belief system affects the amount and how effectively an individual will learn (Borkowski, Estrada, Milstead, & Hale, 1989; Dweck, 1986, as cited in Mulcahy, 1991; McCombs, 1988). Metacognitive instruction has been shown to increase students' academic performance (Cheng, 1993; Derry & Murphy, 1986; Mulcahy, 1991). However, this research has been carried out with children and adolescents and has not differentiated student perceived success and perceived control nor how or if these change with metacognitive strategy instruction.

Adults who are returning to school for academic upgrading have often had repeated failing experiences in their educational years. Researchers,

studying attributional beliefs, have found that repeated success often leads to the belief that one will continue to succeed. Similarly, repeated failure leads to the belief that one will continue to fail. Perceived success (failure) has been found to be positively related to students' future performance (Bandura, 1993; Laffoon, Jenkins-Friedman, & Tollefson, 1989; Zimmerman, Bandura, & Martinex-Pons, 1992). Perry and Penner (1990) found that attribution retraining of first-year college students significantly correlated with an increase in academic performance. Adults returning to school for academic upgrading who have failed in the past are inclined to have the belief that they are liable to fail again which may in turn affect their academic performance. However, this failure belief is thought to be malleable with attribution retraining.

Adult learning theory has also set forth the supposition that adults learn more effectively when they perceive they have some control (Pratt, 1988; cited in Caffarella, 1993). This supposition is also supported by teachers in adult upgrading programs. Adult students who believe that they have little or no control over their work often show signs of frustration which inhibit their learning. Metacognitive programming has been developed to provide the students with knowledge of cognitive strategies as well as instruction and encouragement so that learners take responsibility or control of their learning.

It has been suggested within attributional, adult learning, and metacognitive theories that perceived success and perceived control affect learning. Therefore, it would seem imperative that these beliefs be addressed by the educational system in conjunction with the standard academic upgrading curriculum. It has been supposed that these two variables can be positively changed through metacognitive instruction. If this supposition is correct then metacognitive instruction may be of benefit to many students and be included as part of the school curriculum for all students.

Chapter II

THEORETICAL FRAMEWORK

Perceived control and success play integral roles in the areas of adult learning, attributional, and metacognitive theory. A brief review of these theories followed by empirical research is presented as they relate to perceived control and success. Because the students of interest in this study are adults, literature on adult learning is presented first. This is followed by literature on attribution. Finally, a review of theories and research on metacognition is presented.

Adult Learning Theory

Merriam (1993) states that theories, models, and principles have been developed over the years to provide insight into the nature of adult learners. However, a single explanation has yet to be developed. The following is a short description of the three major influences in adult learning theory, which have taken place in the past twenty-five years (Merriam, 1993). These theories have tried to distinguish adult learning from pre-adult learning and to describe the learning characteristics of adults.

The first major influence referred to by Merriam (1993) is the study of andragogy. The term 'andragogy' was coined by Knowles (1970), referring to 'the art and science of helping adults learn.' Knowles (as cited in Pratt, 1993) made five assumptions regarding what influences adult learning: "(a) self-concept, (b) prior experience, (c) readiness to learn, (d) learning orientation, and (e) motivation to learn" (p. 16). Although Knowles originally viewed these assumptions to be elements related to adult learning, he later noted they were also shared by children's learning. He placed pedagogy and andragogy on a continuum, with the adult learner generally being more independent or autonomous. Adults may start at a point where they require direct teaching of information but will be motivated to quickly move to a place where they will be

more in control of their learning.

The second major influence in adult learning theory is self-directed learning. Caffarella (1993) states there are three key components or ideas that are fundamental to self-directed learning: (a) learners are capable of planning and monitoring their own process of learning, (b) learners have personal autonomy, and (c) the learning environment is arranged in such a way as to allow the learner some control. There has been no research found to date on how these learning components are different from the way children learn. However, the literature on self-directed learning has helped to provide an improved understanding of adult learning (Merriam, 1993).

The final thrust in adult learning theory is Mezirow's (1991)theory of perspective transformation. Clark (1993) states transformational learning produces more "far-reaching changes in the learners than does learning in general, and that these changes have a significant impact on the learner's subsequent experiences. In short, transformational learning shapes people; they are different afterward, in ways both they and others can recognize" (p 47). Mezirow (1991) puts forth the idea that reflection is basic to individuals making transformation. They must reflect on (a) content and process of learning, (b) interpretation of material, and (c) assessment of assumptions. It is through this transformation that people learn and grow. With respect to learning in an academic setting, the transformation can be guided and become an independent process through metacognitive instruction. (This will be discussed in more detail later.) The key word in Mezirow's theory of adult learning appears to be reflection. It is through reflection that adult learning involves...

> becoming critically aware of how and why our presuppositions have come to constrain the way we perceive, understand, and feel about our world; of reformulating these assumptions to permit a more inclusive,

> discriminating, permeable, and integrative perspective, and of making decisions or otherwise acting upon these new understandings. *More inclusive, discriminating, permeable, and integrative perspectives are superior perspectives* that adults choose if they can because they are motivated to better understand the meaning of their existence. (p.14)

Interestingly, when assessing perspective transformation, Mezirow (1991) looks at "expectations, goals, and degree of sophistication with respect to problem awareness" (p.220). (These assessment areas are also important variables in metacognition, discussed in a later section.)

Adult learning theory can be seen as being part of or fitting into attribution. This is supported by three of Knowles' five assumptions of adult learning. It will become clear in the next section that self-concept, prior experience and motivation to learn are integral parts of attributional theory, as is one of Caffarella's key components of self-directed learning, learner control. Mezirow's theory implies that one's belief and meaning systems can act both as building blocks for knowledge to grow, and can limit perceptions of what can be accomplished. The following section provides a short overview of attributional theory.

Attributional Theory

Attributional theory is the study of the process of how individuals make decisions in their lives. More generally it is the cause or factor one attributes to the behaviors of others or oneself. One is thought to attribute behavior to dispositions (personality characteristics) or situations. Petri (1991) states that "attributions, once made, do serve to alter future behavior, rather like motivational variables are thought to do" (p. 299).

Heider's Naive Psychology

Heider (1944, cited in Petri, 1991) is considered to be the founder or originator of attributional theory, which he called Naive Psychology. The term

naive was used to stress that Heider was studying how individuals within the general population perceive the causes of behavior. As mentioned above this theory suggests that one attributes behavior to the disposition or personal characteristics (wants, needs, and emotions) of the individual or to the situation. Dispositions have been categorized into abilities and motivations, and motivation further subcategorized into intentions (plans) and exertions (effort). The situation is categorized into task difficulty and luck. Heider suggests that people have a tendency to attribute behavior to internal (disposition) factors more than external (situation) factors.

Jones and Davis Correspondence Theory

Jones and Davis (1965) expanded on the work of Heider looking more closely at dispositional attributional factors. They posited that individuals try to find a correspondence for the behavior observed and the implied intent. If there is consistency (correspondence) between behaviors seen in the past and present behavior, the present behavior is attributed to the disposition of the individual. However, if the behavior is inconsistent with behaviors in the past, the present behavior is attributed to the situation.

Several factors thought to influence the interpretation of 'correspondence' between behaviors are social desirability, eccentric behavior, and personal involvement. Generally people are not passive about what is happening around them; they make some personal link to it. Jones and Davis divided personal involvement into the two categories of hedonic relevance and personalism. Hedonic relevance refers to the way *we view* the behavior as being rewarding or punishing. Suppose you are shopping and your cart is so full you can't get anything else in it. A checkout person comes and brings you an extra cart. In this instance, the behavior would be attributed to the person being nice as it was a behavior that affected the individual.

Personalism is when *our behavior* influences the behavior of others. Suppose a friend at a cocktail party asks about your research. You start to explain and one member of the group walks away. You may attribute this behavior to the person's rudeness. (In fact he/she caught the eye of a person (s)he hadn't seen in months and left to renew the acquaintance.) Here the discussion of the research is thought to influence the walking away from the group. The behavior of the person walking away is attributed to a personal or 'dispositional' characteristic. As can be seen, more behaviors tend to be attributed to dispositional factors than situational factors.

Kelley's Theory

Kelley (1973) views attributions in the context of how individuals see behaviors causally related to one another, which is consistent with Jones and Davis (1965). However, he stated that the cause of any behavior can be attributed to many factors. Individuals take these factors into consideration and make hypotheses. Through a logical process, the individual will come up with an explanation for the behavior. This process includes the individual using covariation and the augmentation principles to come up with the explanation. Covariation is the way one makes judgments of cause and effect across time (Petri, 1991). For example, a student has three exams and is able to study hard for one of the three but not the other two. The student receives an 'A' in the subject which received the most study time. He/she may think it could be due to ease of the exam, luck, or studying. The next time the student has two exams and is able to study for both and receives 'A's'. Later, the student is unable to study for a test and receives a 'C'. The student then would attribute the 'A' to studying. This series of incidences is referred to as a causal schema and can be seen as similar to Transformation Theory, in that "meaning exists within ourselves rather than in external forms... and that the personal meanings that

we attribute to our experience are acquired and validated through human interaction and communication" (Mezirow, 1991; p. xiv).

Augmentation is the second principle Kelley identifies for how individuals come up with explanations for behavior. The augmentation principle comes into play when external conditions are such that you would not expect to see a behavior, yet it occurs. For example, at a meeting regarding the community outrage over the loss of funding for kindergarten classes, a parent stands up and provides information why this may have some benefits. "The presence of the inhibitory condition augments (i.e., increases) the likelihood that the behavior will be attributed to dispositional characteristics... we are likely to assume that the person willing to speak out against the group's decision feels strongly about the issue" (Petri, 1991; p. 305).

Attribution Theory and Achievement

Weiner has written a great deal on attribution theory as it relates to achievement motivation (Weiner, 1972, 1974, 1979, 1990; as cited in Petri, 1991). He posited that the way individuals view the elements of ability, effort, task difficulty, and luck is related to how they perceive success or failure which, in turn, is tied to their achievement-related behavior.

Weiner's theory assumes that individuals evaluate their ability based on past experiences, and on their performance as compared to others. People tend to associate increased effort with increased success if they have experienced this association in the past. Both effort and ability are viewed as being internal or dispositional characteristics. Task difficulty is most often determined by comparing one's performance with that of others. Luck, either good or bad, is most often associated with situations where the individual has had no control. Both task difficulty and luck are considered to be external or situational factors.

As mentioned above these four elements may be viewed as dispositional

or situational factors. Weiner analyzed the four elements in terms of 'stable or unstable' traits. Task difficulty and ability are considered to be stable, whereas effort and luck are considered unstable. See Figure 1 for a visual presentation of Weiner's elements, attributional factors, and stability factors.

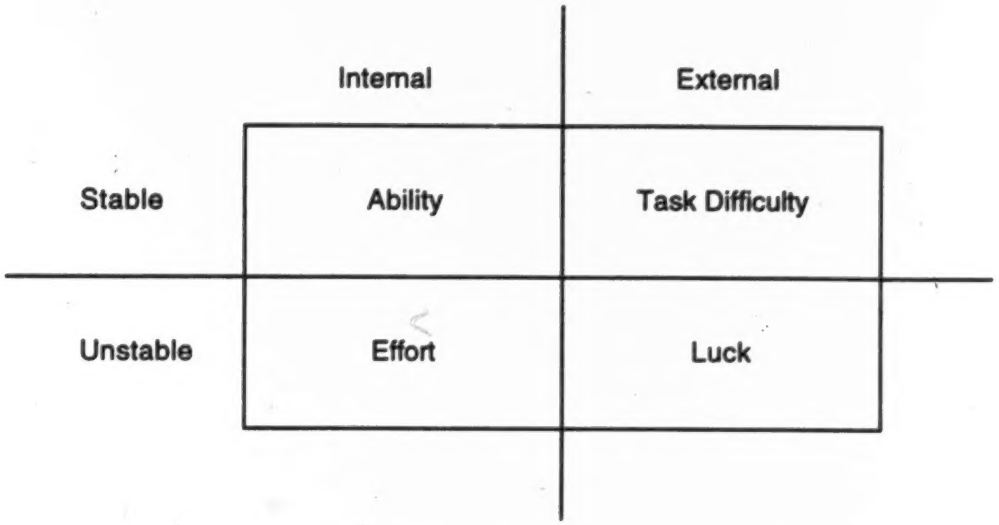

Figure 1. Weiner's Model of causal ascriptions of ability, task difficulty, effort, and luck as related to the dimensions of stability-instability and internality-externality. (Petri, 1991, p. 308)

Weiner continued to modify his attributional theory to include locus, stability, and controllability. He drew from other motivational theories that are also concerned with control, such as competence motivation and personal causation. White (1959) defined competence as the ability to deal with one's surroundings effectively. Petri (1991) states, "In adult competence behavior can become quite differentiated, so that one might even consider achievement behavior as energized by effectance motivation, the control aspect in this case being to excel intellectually" (p. 332).

DeCharms (1968) further delineated the concept of control, suggesting one's aim is to be the causal agent in the environment. Personal causation is viewed as a basis for all motivated behaviors. Another way of viewing personal causation is that the individual wishes to be the 'originator of the effects' and be able to make choices. (This is also similar to Rotter's, 1975, locus-of-control concept.)

Another important concept related to motivational theory and achievement is the expectancy-value theory (Ames, 1992; Atkinson & Birch, 1978; Borkowski & Turner, 1989; Dweck, 1986; McCombs, 1988; Weiner, 1977). This theory suggests that the probability of success at a specific activity is dependent upon both the value of the activity (goal), as well as the individual's expectancy of being able to achieve at that activity (goal). Atkinson and Birch (1978) referred to this as 'cognitive expectation'. When attempting an academic activity, three variables are thought to come into play -- the motive for success, the probability of success, and the incentive value of achieving the success. The motive for success is considered a stable personality characteristic, possibly learned in early childhood. The probability of success is the individuals subjective estimate of succeeding in the specific activity; this varies in different situations depending on past experience with similar activities. Incentive value is the value the individual places on succeeding at the specific activity.

Dweck (1986) has developed a theory of motivation and attribution and how they relate to views of intelligence (causal factors), confidence in ability (expectancy of success and failure) as well as goal orientation and behavior patterns within the area of learning or academic achievement (See Table 1).

Table 1

Achievement Goals and Achievement Behavior

Theory of Intelligence	Goal orientation	Confidence in present ability	Behavior pattern
Entity theory	**Performance goal**	**If high** →	**Mastery-oriented**
Intelligence is fixed	Goal is to gain positive judgments/avoid negative judgments of competence		Seek challenge
		but	High persistence
		If low →	**Helpless**
			Avoid challenge
			Low persistence
Incremental theory	**Learning goal**	**If high** →	**Mastery-oriented**
(Intelligence is malleable)	(Goal is to increase competence)	**or low**	Seek challenge (that fosters learning)
			High persistence

Individuals may believe that intelligence is fixed as an entity or ability, or that it is malleable. Depending on this belief, the individuals' goal orientations will be performance or learning oriented. If individuals believe that intelligence is fixed, they will be performance oriented and tend to want to gain positive judgments from others. However, if they believe that intelligence is malleable and have an incremental theory, they will be learning oriented and want to increase their competence in the learning area. The confidence the individuals bring to the situation may be high or low. If they have an incremental theory of intelligence accompanied by either high or low confidence, they will develop a mastery-oriented behavior pattern, with the tendency to seek challenges and persist with the task. This pattern is also developed for individuals who believe in a fixed theory of intelligence and have high confidence. However, they will avoid challenge and be less persistent, developing a helpless behavior pattern if they have low self-confidence .

Ames (1992) achievement goals theory is similar to that of Dweck. She also describes two contrasting achievement goal constructs - mastery goals and performance goals. When individuals have mastery goals, (a) their locus of control is internal, (b) their belief system is such that effort will lead them to success, (c) there is intrinsic value in learning, (d) self-worth is based on effort more than ability, and (e) when success is not met, it is attributed to poor strategies so they tend to change strategies and persist. When individuals have performance goals, their locus of control is external and learning is only a means to a goal. They believe that success comes from ability not effort, and self-worth is dependent upon performance. These individuals tend to avoid activities when they are not sure they will succeed.

Since the time of Heider, the originator of attributional theory, it has been posited that people are in pursuit of finding out the causes of behavior and that

people have a tendency to attribute behavior to internal (personal) factors. Jones and Davis, and later Kelley proposed that individuals look for corresponding events that will support their attributions. This is very important for students' achievement attributions because if they have had repeated experiences of failure with no explanation or incorrect information as to why they have failed, they will likely attribute the failure to an internal or personal factor. ("I am not smart.") Weiner's model of achievement attribution builds on these attributional theorists' view of locus of causality and adds locus of control and stability. Researchers such as DeCharms, Rotter, Dweck and Ames all support the importance of the individual's belief system with respect to control and success.

Empirical evidence regarding attribution retraining

In order to be of practical use to educators and students, research is needed to support the contentions that attributional beliefs are indeed related to academic achievement and that they are malleable to instruction and/or learning experiences. The following section discusses some of the empirical research addressing this question.

Perry and Penner (1990) studied the effect of attribution retraining on locus of control with respect to test results and homework assignments for first year psychology students at university. This study also looked at the interaction of locus of control with high and low expressive instructions. (Expressiveness was defined as physical movement, voice inflection, eye contact, and humor.) Students were administered the Multidimensional Multiattributional Causality Scale to determine whether they had an internal or external locus of control after which they were randomly assigned to an attribution retraining group or a control group. The attribution retraining consisted of an eight minute video of a professor recounting his first year experience with failure and how study

strategies and persistence led to his success. Each of these two groups were randomly assigned to both high and low expressive instruction and given a homework assignment. One week later the four groups completed two tests; one on the assigned homework and one on the lecture material. It was found that students with attribution retraining performed significantly better than the control group. More specifically, students with external locus of control who received attribution retraining performed better on the two tests than those who did not receive retraining. When looking at students receiving attribution retraining, it was found that students who had an internal locus of control showed an increase in internality. However, the students with external locus of control did not show an increase in internality. An interaction was found for expressiveness of the instruction and the student locus of control. Students with external locus of control performed better with the high expressive instruction than with low expressive instruction. Students with internal locus of control were not affected by the level of expressiveness.

These findings would suggest that with attribution retraining academic performance increases. Findings also show that locus of control is malleable for students with an internal locus of control, but it was not found to change with students with external locus of control. This lack of change could be due to the short time the students were exposed to attribution retraining. Also transformational theory and self-directed learning suggest that the adult needs to be more actively involved in the process of change. Possibly individuals with external locus of control require a more active participation in the change process, and/or these individuals may require an extended period of time to make this change. It should be noted that this study was carried out with students who had 'some' success in the past, as they were able to attend university. When students are returning to school, it is necessary to ascertain if

and what kind attribution retraining will aid in changing this perception and if in turn this change leads to increased academic performance. Therefore, research is needed to see if attribution retraining would have the same effect on students who may not have had the same successful educational experiences as those in the Perry and Penner study.

Menec, Hechter, Eichholz, and Perry (1992) carried out a similar study to that of Perry and Penner (1990), but included the variable of how well students performed on a introductory psychology class test, and varied the number of attribution retraining sessions to zero, one, two or three. (Sessions were similar to those in the previous study.) Results indicated that attribution retraining enhanced academic performance for students with previous low performance (success) and who received high expressive instruction. This enhanced performance was not seen with low expressive instruction. This study would suggest that the effect of attribution retraining is dependent upon both individual differences (past success) and differences in instruction.

Both of the previously mentioned studies used only one method of attribution retraining, that of students being told how persistence, study strategies, and effort can lead to success. This would suggest that learning is under the individual's control. However, the method of attribution retraining does not allow the students to be active participants in the changing of attributional beliefs. Metacognitive instruction includes attribution retraining and does so in such a way that the students are actively involved in the process or realization that they do have some control over their learning situation and in achieving success.

As presented earlier, components of adult learning theory can be viewed as being imbedded in attributional theory. These components and others are also viewed as general components of metacognition. Caffarella's (1993) three

key components or ideas are fundamental to self-directed learning; (a) the individual is capable of planning and monitoring his/her own process of learning, (b) the learners have personal autonomy, and (c) the learning environment is arranged in such a way to allow the learner greater control. Mezirow (1991) views reflection as basic to adults making transformation. They must reflect on (a) content and process of learning, (b) interpretation of material, and (c) assessment of assumptions. Interestingly, when assessing perspective transformation Mezirow (1991) looks at "expectations, goals, and degree of sophistication with respect to problem awareness" (p.220). All of these components or ideas are aspects of what makes up, in part, metacognition. Metacognitive theory is presented next.

Metacognition

Metacognition is considered one of the key components of successful learning. Metacognitive strategy teaching has been found to change elementary, junior, senior high, and college students' academic performance (Biggs, 1988; Cheng, 1993; Mulcahy, Peat, Andrews, Clifford, Marfo, & Cho, 1989; Paris & Winograd, 1990).

Metacognition is a relatively new term in psychology (Cheng, 1993). It has been referred to as (a) knowledge about and understanding of one's own cognitive processes (Borkowski & Kurtz, 1984; Paris & Jacobs, 1984; Paris Lipson & Wixson, 1983), (b) knowledge about variables related to the person, task, and strategy (Flavell, 1979), as well as (c) "executive control" of cognitive activities (Reeve and Brown, 1985). Two themes have been recognized in the research. The first is the knowledge of one's own cognitive states and processes. This includes the *what*, *when*, *how*, and *why* of one's cognitive knowledge (Paris, Lipson, & Wixson, 1983). This knowledge also includes one's self-appraisal of one's own abilities. Does an individual believe in his or

her ability to succeed in the task at hand? The second theme is that of self-management. This is the ability of the student to plan, monitor, and revise, or the ability to control his or her learning. Paris and Winograd (1990) state that "Cognitive self-management is a popular aspect of metacognition because it has direct implications for students' performance and subsequent instruction" (p.18).

Borkowski and colleagues (Borkowski, Estrada, Milstead, & Hale, 1989; Pressley, Borkowski, & O'Sullivan, 1985; Borkowski & Turner, 1989) have put forth a model of metacognition that attempts to describe the way strategic skills are acquired. This model is one of the more comprehensive and easily understood models of metacognition which includes attributions. Therefore, a description follows. This model was developed with children; however, it is the premise of this and other researchers that the model can be ascribed to adults' strategic learning. The major components of this model are Specific Strategy Knowledge, Relational Strategy Knowledge, General Strategy Knowledge (and associated beliefs about efficacy), and Metamemory Acquisition Procedures. (See Figure 2)

> These components have independent histories... and fulfill unique roles in explaining differences in problem-solving abilities among normal and exceptional children. Although the metacognitive model originally focused solely on operation of strategic processes in memory (Borkowski, 1985; Pressley, Borkowski, & O'Sullivan (1985), its components can be applied to a wider range of cognitive activities. (Borkowski, Estrada, Milstead, & Hale, 1989, p.58)

1. Specific Strategy Knowledge. Students are taught to use a strategy and by repetition learn the characteristics of that strategy. The characteristics learned would include the efficacy of the strategy and the range of pertinent applications.

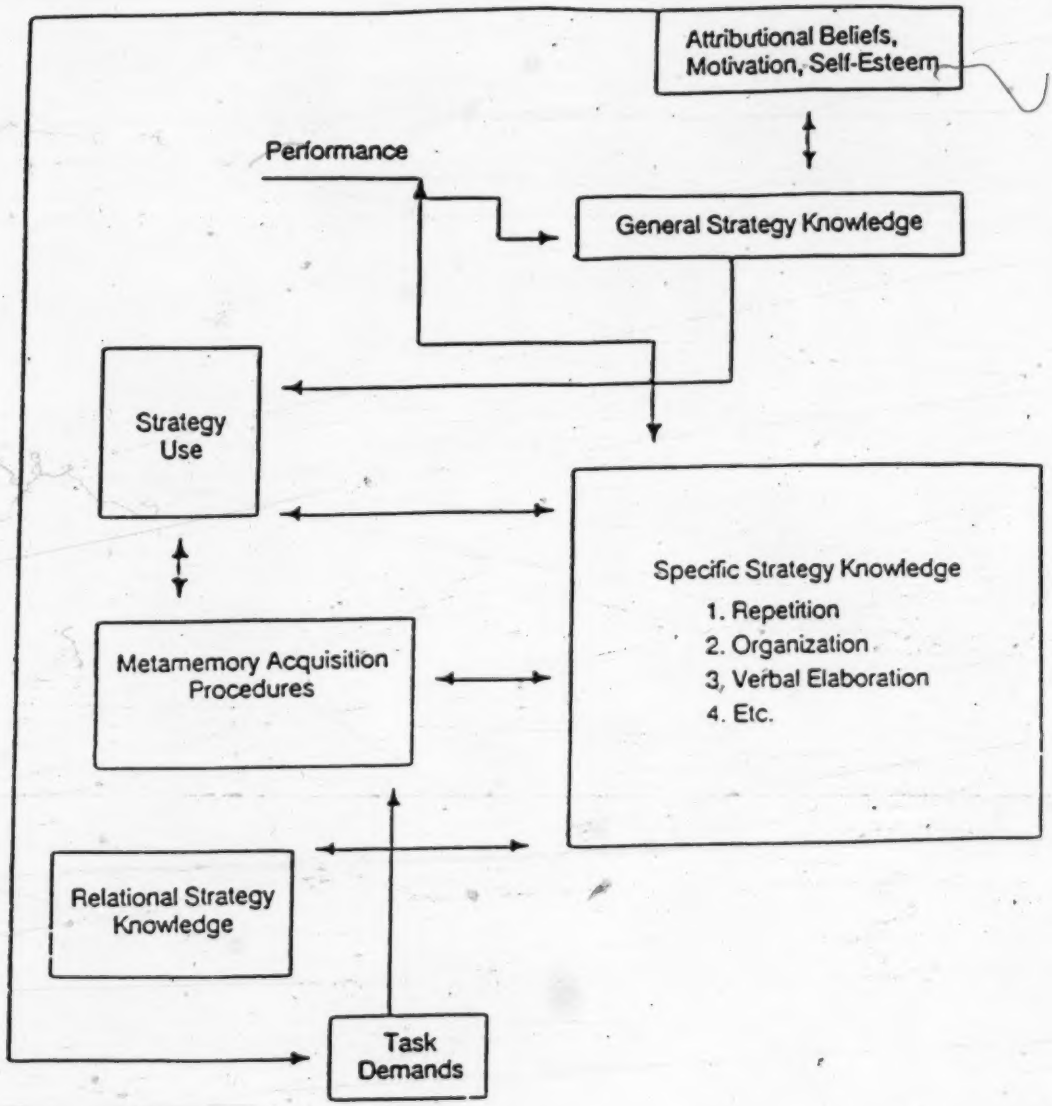

Figure 2. Borkowski's Model of metacognition (1989).

This is considered specific strategy knowledge. With respect to Adult learning theory, this would be the direct teaching needed by adults before they quickly move onto their own decision making as to what and how information should be learned.

2. Relational Strategy Knowledge. Relational Knowledge is the understanding the students develop as they learn several strategies and can ascertain the similarities and differences of the strategies. Relational knowledge may be taught by the teacher or may be acquired intuitively or both. This is dependent upon student characteristics.

3. Metamemory Acquisition Procedures. Once the students have specific strategy knowledge they learn to select and monitor the appropriateness of the strategy for given tasks and adjust the strategy where needed. This is the metacognitive acquisition procedure and can be equated to executive functioning, which Belmont (1978) and Sternberg (1985) view as central to intelligence. It can also be viewed as the aforementioned self-management theme. The student is now making decisions on what strategy will work best for the specific task, in relationship to how and when he/she best learns and retains information. In making these decisions the student takes more control and responsibility for his or her own learning.

4. General Strategy Knowledge. When the students have gained general strategy knowledge, they "recognize and believe in the general utility of being strategic" (Borkowski, et al, 1989, pp. 58-59). They learn to attribute their success or lack thereof to the appropriate use of the strategy. The acquisition of general strategy knowledge often goes hand in hand with the generalization of strategy use. It can also be viewed as the aforementioned theme of knowing one's own cognitive states and processes.

Borkowski's (1992) approach to metacognitive theory encompasses the assumptions that learning is related to motivation and self-regulation, along with the other factors of ability, basic cognitive knowledge, cognitive strategies and implementation, executive processing, and self-esteem, to name a few dimensions.

Derry and Murphy (1986) point out the need for metacognitive training. In their review, there are literally hundreds of studies investigating the effectiveness of specific strategies. However, there are "relatively few" (p. 2) addressing what may be referred to as metacognitive training. They also point out that students having difficulty with learning not only lack in specific strategy knowledge; they also have little knowledge in the area of planning, implementing, and monitoring the use of these strategies. These self-regulating abilities need to be taught and assessed in order for students to be able to learn on their own or be able to discern what they need in order to learn. These authors also suggest that learning is not just a cognitive endeavor. Cognition and affect work together to achieve an end result.

Students with past learning difficulties also need to be 'sold' on the utility of appropriate strategy use (Mulcahy, et al. 1989). In being 'sold' on the utility of the strategy, they begin to develop a positive belief (attributional) system. This belief system includes the belief that the students have some control over their learning and that they indeed can succeed. The way individuals develop their perceptions about control and success regarding learning is an evolutionary process. These perceptions are developed over time and require an extended period of time to alter.

Empirical research regarding Metacognitive Instruction

Presented here are a few research studies comparing the effectiveness of attribution retraining to metacognitive training.

Van Overwalle, Segebarth, and Goldchstein (1989) examined the efficacy of attributional techniques or attributional techniques plus study skills training (specific strategy knowledge) for university freshmen who had failed a mid-term economics examination. There were two experimental groups and one control group. Both treatment groups were given attribution retraining together. This retraining included a 13 minute tape of four students recounting reasons for their failures in their first year of economics or psychology class. The general reasons consisted of lack of effort, lack of strategies, poor use of strategies or poor time management. The student video was followed by a psychology professor video explaining how effective a strategies course was for students who had previously failed a course in their first year. "To provide more concrete information on effective study strategies, three short brochures with general guidelines on Studying Theory, Scheduling Study Time, and Practicing Exercises were handed out" (p.80). Twelve students were then randomly selected to participate in individual study skills training consisting of four, three, two, or one sessions (each) lasting 45-60 minutes. It was found that students who had watched the videos performed significantly better on the final economics exam than the control group. However, there was no significant difference between the two experimental groups. This lack of difference between the two experimental groups could have been due to the availability of the study skills handout (contamination). Students, who after viewing the videos believed that success was under their control (due to change in effort and/or strategy), may have used the information provided to increase their performance. Another possibility is that the students may have had the specific strategy knowledge but did not use it because they did not believe it would make a difference. With a change in attribution, they may have put this knowledge to use. An interaction between groups and attributional disposition was found. Students who attributed failure to lack of intelligence prior to attribution retraining and were

in the study skills group increased their scores significantly when compared to the other two groups. This finding supports that of Menec, Hechter, Eichholz, and Perry (1992); the influence of instruction and training programs is dependent upon individual differences with respect to what and how one attributes success.

Van Overwalle and De Metsenaere (1990) investigated the effectiveness of attribution retraining and strategy programs under four different conditions - - attribution retraining, strategy instruction, attribution and strategy programs as well as control. The sample, one History of Belgian Politics class, consisted of 124 freshmen law students. Similar procedures for attribution retraining were used as in the Van Overwalle et al., (1989) study; however, no written information was given to the attribution retraining students. The study strategy course took place during class time and lasted approximately 60 minutes. It was found that more students viewing the attribution video passed the final exam than those who did not (35% and 15%, respectively). No main effects were found for experimental conditions. However, when student ability was differentiated into high, medium and low, it was found that students who received attribution retraining and had medium scores on the mid-term performed significantly better on the final exam than those who did not. These results again suggest that the effectiveness of programs is dependent upon individual differences within the students. There is some question why the strategy training did not show an increase in learning. It could be that discussing specifics of strategies is not enough to make a difference. Students may need to practice these strategies and develop relational knowledge, metacognitive acquisition procedures as well as general strategy knowledge to show the effectiveness of strategy use.

Although there is research supporting the premise that attribution retraining enhances academic performance for adults, there is little research available relating metacognitive training to the enhancement of the particular

attributions of perceived control and perceived success, as well as academic achievement. However, Borkowski and his colleagues provide support for these suppositions investigating these variables with children.

Kurtz and Borkowski (1984) explored the relations among knowledge, process and attributions, and how they relate to posttest scores on memory tasks. Sixty first and third-grade children were divided into three treatment groups receiving task-specific strategy instruction, general metacognitive information, and both strategy and metacognitive instruction. The two groups that received strategy instruction (task-specific strategy and strategy and metacognitive instruction) performed better on the memory tasks than the metacognitive-only treatment group. Of particular interest to the proposed study is the interaction between attribution of success and performance. "Among strategy-trained children those who attributed success to effort were both more strategic and higher in metamemory than those who attributed task outcomes to non controllable factors such as ability or task characteristics " (p. 335). The researchers suggest that further research is needed to acquire more specific knowledge regarding metacognitive and attributional variables and how they relate to good and poor learning performance.

Reid and Borkowski (1987) investigated the effectiveness of three treatments for children with hyperactivity: (a) strategy instruction, self-control training, and attribution retraining regarding the importance of effort in improving performance; (b) strategy instruction plus self-control training; and (c) strategy instruction. "Analysis of short and long-term treatment effects showed that children who received attribution training used more complex strategies, demonstrated higher personal causality scores endorsing effort, and displayed reduced impulsivity" (p. 296). These results were maintained over a ten month period.

The aforementioned research provides some empirical support for the relationship between attributions, metacognition, and performance. However, research is needed to illuminate just how they are related, particularly with a population of adult up-grading students. Are the attributional variables of perceived control and perceived success linked together, or are they two separate variables that with different combinations, affect learning differentially? How amenable are these variables to change within various populations? Will metacognitive instruction affect these variables and, in turn, influence performance outcomes?

Summary

Current metacognitive theory has established two themes - - knowledge of one's own cognitive states and processes, and self management. The Borkowski et al. (1989) model incorporates these two themes as well as others which are linked to attributional theory as well as adult learning theory. Within metacognitive instruction, learners are taught specific strategy knowledge. Through dialogue and practice, they learn how and when to use the strategies. After several strategies are taught, students learn to compare and contrast strategies (relational knowledge) and decide where, when, why, and how to use the strategies within various circumstances (metacognitive acquisition procedures). The metacognitive acquisition procedures are consistent with the positive learning outcomes previously mentioned in adult learning theory and attributional theory, in that they allow students to have some control in their learning situation. After the students acquire the above specific knowledge, they develop a general understanding of strategies and strategy use. The general strategy knowledge students gain is consistent with adult learning and attribution theory in that the strategies allow the students to believe in their success and future success if appropriate strategies are implemented.

Expectancy of success, knowledge of and reflection on the what, when, how and why of knowledge and Knowles' five assumptions of adult learning are included in the aforementioned theme of cognitive states and processes and self-regulation. This belief system will lead to a more mastery-based pattern of learning (Dweck, 1975, 1986) which, in turn, leads to persistence in academic endeavors.

This review of adult learning, attribution, and metacognitive theory suggests that perceived control and perceived success are integral components of these theories. Also suggested is that adult upgrading students' perceived control and success may indeed need to change before these students are able to benefit fully from formal education. As previously mentioned, many of these students have failed in the past which may lead to the belief that they will continue to fail. Also, these students may have been found to have a low sense of control over their learning. This can lead to frustration which, in turn, can inhibit concentration and learning. Empirical research supports the contention that attribution retraining does in fact enhance academic performance over short term studies with young children as well as university freshmen. It is also supportive of the contention that metacognitive training improves or enhances academic performance. Van Overwalle et al. (1989) found that a high number of students who perceived study strategies as controllable also had enhanced performance. Menec et al. (1992) found that students who believed they would succeed also had enhanced performance. Perry and colleagues have carried out several studies that used attribution retraining to change perceived control and success, and found that this retraining enhanced academic performance. Other researchers have compared attribution and metacognitive training to investigate which treatment showed the greatest academic enhancement. Few if any studies have investigated the influence and effectiveness of a

metacognitive strategies class for adult-upgrading students in relation to their perceived control and perceived success in the academic stetting, as well as enhanced performance on a reading comprehension or math assessment. That is the purpose of this study.

Chapter III

RATIONALE

Borkowski, Johnston, and Reid (1986) stated that "Attribution theory has provided a link between children's beliefs about causes of success and failure and their failure expectations about performance (Weiner, 1979)" (p.164). These achievement expectations are said to influence the amount of effort one will expend on future tasks and the caliber of responses as well as the tenacity shown following success or failure experiences. Expectations are connected to students' perceptions of control and success which are developed through their school years (Stipek & Weisz, 1981). These perceptions are thought to affect the outcome of academic performance. Metacognitive strategy teaching has been found to increase elementary, junior, senior high and college students' perception of locus of control and causality (success).

Research in the area of attribution retraining has measured perceived control and perceived success and related the positive change of these variables to enhanced academic performance. However, the attribution retraining has not involved active participation of the learner, nor has maintenance and generalization of the increase in perceived control and perceived success been addressed. Metacognitive research has addressed attribution in general terms but has not specifically measured if perceived control and perceived success are enhanced with metacognitive instruction.

Much of the research (Chen & Tollefson, 1989; Menec, Perry, Struthers, Schonwetter, Hechter, & Eicholz, 1994; Magnusson & Perry, 1989; and Platt, 1988) has measured perception of success and perception of control by asking participants to respond to one or two Likert statements. In order to acquire a more reliable measure this research developed and assessed the reliability and validity of a new instrument called the Perceptions of Academic Achievement

Scale(PAAS). This scale was then used to measure perceptions of control and perceptions of success of the subjects in this study.

The purpose of this study will be to investigate the influence and effectiveness of a metacognitive strategies class for adult upgrading students on their perceptions of control and success as well as performance on a reading comprehension and a general mathematics assessment.

If educators are going to assist adults returning to school, it is important to ascertain if metacognitive training indeed changes perceived control and success as well as performance on academic tasks. In order to address the purpose of this research the following questions will be investigated:

1. Is there a change in adults perceived control and perceived success after completing a four month metacognitive strategies class?
2. Is there a change on reading/math performance scores for individuals who have completed a metacognitive strategies class?

Chapter IV

METHOD

This chapter addresses research design, followed by a description of the subjects, procedures, and program implementation. The final section describes the instruments used in the study.

Overview

There were two phases to this study. Phase one had two objectives. The first objective was to address the reliability and validity of the Perception of Academic Achievement Scale (PAAS). The analyses were aimed at exposing any poorly worded items and confirming the reliability as well as both the factorial and theoretical validity. The second objective was to carry out an initial investigation of the influence and effectiveness of a metacognitive strategies class for adult upgrading students in relation to attributional beliefs of control and success, as well as performance on standardized reading comprehension and mathematics assessments. An additional objective was to ensure the program was appropriate for students at this level in the educational process and to develop a good working relationship with the staff at the participating college for the continuing research.

The objective of Phase Two of the study was to further investigate the influence and effectiveness of a metacognitive strategies class for adult upgrading students in relation to attributional beliefs of control and success, as well as performance on a standardized reading comprehension and mathematics assessment.

Subjects

The total number of subjects who participated in Phase One of the study included 157 adult students registered in 8 different classes at a vocational college in Alberta, during the fall term of the 1995/96 academic year. The final

results were interpreted from the scores of 134 students as some students did not complete a portion of or an entire section of either the first or second writing of the assessments. The classes were reported to have students who fell in the high school academic range of achievement and included three English classes, two English strategies classes, two Math classes, and one Math strategies class. There were 91 females and 66 males whose age ranged from 20 to 52 years. All results from students in the eight classes were used in the factor analysis. Three English and one Math class were involved in the test retest reliability portion of the analysis. The remaining four classes were then part of the major study.

The subjects for Phase Two of the study included adult students registered in the metacognitive strategies courses (English and Math Strategies) at the vocational college during the fall and winter terms of the 1995/96 academic year. (Class registration is generally 15 to 20 students with a 25 to 30 percent attrition rate.) A total of 98 students (two English and one Math strategy class and one each of English and Math control classes) between the ages of 19 to 50 years participated. The students in the experimental group enrolled in classes to learn strategies related to either high school English or Math as well as time management and study skills. The students for the English strategies classes were divided by the teaching staff such that one class consisted of students enrolled in grade 10 and 11 English classes; the other class included students enrolled in grade 11 and grade 12 English classes. The Math strategies classes catered to students registered in grades 10, 11 and 12. These courses were offered to students who may have been having difficulty in the area or who were concerned that the subject may cause them some difficulties. Students either independently registered for the course or had been recommended by previous instructors. Students were informed of the study

prior to enrolling in the class.

As mentioned above strategies classes from the fall term were incorporated into the experimental and control groups for Phase Two. The English experimental group for the fall term consisted of two classes. The English Strategies class consisted of 8 female and 2 male students ranging in age from 22 to 44.5 with a mean age of 30.1. The second English Strategies class consisted of 7 female and 3 male students ranging in age from 20.5 to 46.5 with a mean age of 30.7. The English experimental group for the winter term also consisted of two English strategies classes. The first English strategies class consisted of 12 female and 2 male students ranging in age from 19 to 48 with a mean age of 32.6. The second English strategies class consisted of 4 female and 1 male students ranging in age from 24 to 42 with a mean age of 33.4.

The fall term English control group consisted of 10 female and 9 male volunteers from an intact English 10 class. Their ages ranged from 21 to 41 years with a mean age of 30.7. The winter term English control group consisted of 8 female and 4 male volunteers from an intact English 10 class. Their ages ranged from 23 to 50 years with a mean age of 34.5.

The fall term Math experimental group consisted of 8 females and 1 male from a Math strategies class. Their ages ranged from 20.3 to 43 with a mean age of 31.4. The winter term Math experimental group consisted of 6 females and 2 males from a Math strategies class. Their ages ranged from 24 to 41 with a mean age of 31.3. The Math control group consisted of 9 female and 2 male volunteers from an intact Math 10 class. Their ages ranged from 21 to 34 with a mean age of 28.2.

There was a total of 70 students participating in the English area; of whom 39 were in the experimental group and 31 were in the control group.

There was a total of 28 people participating in the Math area; of whom 17 were in the experimental group and 11 were in the control group.

Although the metacognitive strategies course is not required or accepted for course credit for a diploma, students could use it to make up full time registration. (It could be used as a third course for funding purposes.) All classes met daily for 70 minutes.

Procedures

In Phase One, the researcher met with the teaching staff of the experimental group two weeks prior to the commencement of the school term to provide written information and discuss the research. The teachers were asked for input as to the appropriateness of the wording of consent forms as well as the Perception of Academic Achievement Scale (PAAS). As a result, some slight modifications were made. The further development of this scale is described later in this chapter. Written information regarding the research, as well as consent and informational forms were given to the coordinator of the Learning Support Services at the college. The researcher was given a list of teachers who might be interested in having their students participate in the study as controls. Several teachers were contacted and volunteers accepted.

Phases One and Two of the research followed the same general format during the fall and winter sessions, respectively. Informed consent forms were obtained at the initial meeting of students and researcher during the first week of classes. (See Appendix A and B). Students were administered the PAAS and the appropriate academic assessments during the second and third week of classes, respectively. The Metacognitive and Cognitive Strategy class was taught following the College's Metacognitive and Cognitive Strategies Instructional manual. The PAAS and the appropriate academic assessments were re-administered during the second last week of the second last month of

the term. The program implementation time up to the final administration of assessments encompassed 15 weeks with 70 minutes of daily classes. Table 2 provides a timeline for the research.

Table 2.

Timeline for Phases One and Two of the Study.

Phase I - Week of Sept. 5 - 8 **Phase II** - Week of Feb. 5 - 9	Experimental and control students had project explained to them again and asked to sign consent forms.
Phase I - Week of Sept. 11 - 15 **Phase II** - Week of Feb. 12 - 16	Students completed the PAAS and the locator tests of the CAST.
Phase I - Week of Sept. 18 - 22 **Phase II** - Week of Feb. 19 - 23	Students completed CAST - Comprehension/Math subtests.
Phase I - Week of Oct. 12 - 16	Students who were participating in Test retest reliability portion of the study signed consent forms and were given the first administration of the PAAS.
Phase I - Week of Oct. 26 - 30	Students who were participating in Test retest reliability portion of the study were given the second administration of the PAAS.
Phase I - Week of Dec. 18 - 22 **Phase II** - Week of May 20 - 24	Experimental and control students completed PAAS and CAST-Comprehension / Math subtests.

Program Implementation

The Vocational College's Metacognitive and Cognitive Strategy Instructional Manual (Mulcahy, Lacroix, Patterson, & Wiles, 1995) was used to guide the instruction of the strategies classes. In order to be consistent with adult learning theory, the instructors were asked to encourage student input and take some direction from the students as to their most immediate needs. It was suggested that by doing so students would have more control over their

learning.

The college manual follows the principles and teaching phases set out by the Strategies Program for Effective Learning/Thinking (SPELT) (Mulcahy, Marfo, Peat, & Andrews, 1987). The SPELT program has been used in research by Brenton-Haden (1997), Chen (1993), Peat, Mulcahy, & Darko-Yeboah (1989), and Mulcahy, Peat, Clifford, Marfo, & Cho (1989). Consistent with SPELT, the adult program is based on cognitive theory and has the following underlying assumptions:

> Learning is an active, constructive process that involves the student's use and management of his or her own cognitive processes. Learning is comprised of two cognitive components, both of which are important: those which deal with the emotions and feelings (affect) and those which deal with the content (academics). (Mulcahy et al. 1995; p.4-5)

The program consists of a three-phase model beginning with direct instruction and continuing to a point where the students are able to develop their own strategies. Phase I consists of direct teaching where the students are made aware of strategies and how effective use of these strategies can enable them to attain, remember, retrieve, represent, and apply information and ideas. The goal is to increase the students specific strategy knowledge and to make them aware of the benefits of strategic behavior. In Phase II students are asked to compare the various strategies taught in Phase I and to adjust them to suit the task, situation, and their own learning style. The goals in Phase II are to personalize the strategies and to transfer and generalize them to other content and life situations where appropriate. Various teaching methods may be used to facilitate the students learning in Phase II, for example, Socratic Dialogue, paired or group problem solving, thinking aloud, cooperative group work as well as developing pros and cons of the various strategies. In the final phase, Phase

III, the goal is to have the students develop their own strategies using the knowledge base developed in Phases I and II and to further refine and broaden the applications of strategies. Various problem solving approaches are used in Phase III. A more detailed discussion of the instructional approach is presented in Mulcahy, Lacroix, Patterson, and Wiles (1995). (This may be obtained through e-mail - bob-mulcahy@ualberta.ca.)

Instructor background - The strategies instructors had been in-serviced on the SPELT. (This was a volunteer in-service and instructors were not tested on their knowledge or understanding.) As well, a cognitive and metacognitive instructional manual had been developed specifically for teaching students at this college. The teachers of the control classes were not previously aware of the SPELT program and did not implement the program within their classrooms. This was confirmed by discussion with the teachers as well as, through several visits to the classrooms by the researcher.

One teacher was responsible for the three English Metacognitive Strategies classrooms for the two terms, and also taught an academic English 20 class. She had been teaching English Strategies classes at the college for three terms prior to the research. Two students in her strategies class also attended her regular English class. The other English strategies teacher taught one strategies class the first term as well as teaching a beginning English class, which had students who are not yet at the high school English level. The two teachers for the control groups each taught two English 10 classes and one English 13 class.

The teacher responsible for the two Math Metacognitive Strategies classrooms also taught a Math 13 class and a computer class. He had been teaching Math strategies for a number of terms prior to the research. No students in his strategies class attended his regular Math or Computers classes.

The teacher for the Math control group taught three Math classes.

Treatment Fidelity

In order to ensure the program of research was carried out as previously described, several procedures were implemented including initial and ongoing teacher/researcher communication, observation as well as teacher and student record keeping.

1. Observations: The researcher observed in the classroom, discussed observations, and responded to any concerns and questions of the instructors. The researcher went to the classroom to observe a 70 minute instructional session once a week for the first six weeks, once every two weeks for the next six weeks, and monthly for the remainder of the term. This involved a total of 11 visits per strategy class. Contact was made with the instructors prior to the observation day to confirm the date. Observations addressed the strategies taught, the teaching method used, and the Phase of the program.

2. Record keeping: The instructors were asked to keep a record of the strategies taught, the teaching method used and the Phase of the program that was covered. Also included in this record was other instruction that might not be included in the above, and comments as to what was successful and not so successful (See Appendix C).

Students were also asked to keep a record as to what strategies were taught in the class, and if they tried them in the strategies class, the Math or English class, other classes, or in other parts of their life. Also included was a section for comments (See Appendix C).

The researcher discussed the program at length with the instructors at the College and obtained their agreement with respect to the above procedures. (A letter then was sent out to the instructors confirming the agreed-upon procedures. See Appendix C.)

Instruments

As previously mentioned the students were administered an academic achievement test in either reading or math and a Perceptions of Academic Achievement Scale. These assessments are discussed below.

1. The Canadian Achievement Survey Test for Adults (CAST) - Comprehension and Math subtests served as both pretest and posttest to assess change in these two academic areas. This test is relatively new but was chosen because it is appropriate for the Canadian adult population, and instructors at the college preferred it to the Test of Adult Basic Education. The manual reports the correlations for number-correct for the corresponding Canadian Achievement Test (CAT) and CAST levels. The correlations are from 0.84 to 0.90 for reading comprehension and from .88 to .91 for math subtests. The manual suggests that these correlations can be thought of as alternate form reliability coefficients and can be considered to be at an acceptable level. (See Appendix D for description, standardization, and administration procedures of the CAST.) As indicated above, the CAST was administered twice during the term as pre and posttest measures.

Prior to the students writing the CAST reading comprehension and math subtests, they were given a locator test, to help ensure the correct level of assessment was administered. The results of these assessments were available to students at the end of the term.

2. Perceptions of Academic Achievement (PAAS) - Students' perceptions of success and control regarding their future scholastic achievement was measured by combining two Likert questionnaires. Perry's (unpublished) Perceived Control Scale 90 was used, with slight modifications to make it more suitable for students at the college academic upgrading level and for the specific areas of English and Math. (See Appendix E for the original and

modified Perceived Control Scale.) This scale included 16 items. Data for the reliability and validity of this scale have been collected and it would appear to be adequate (R. Perry, personal communication, 1995 / 08). Perry carried out two studies involving 251 and 327 first year psychology students registered at the University of Manitoba. Results yielded Cronbach Alphas ranging from .798 to .848 for the full scale assessment and correlations of .417 and .458 for test retest reliability. Factor analysis yielded three main factors with Cronbach Alpha's ranging from .465 to .748.

A new Perceived Success Scale was developed for this study based on main components identified in the literature review consistent with adult learning, attribution and metacognitive theory (See Appendix F). The items on the perceived success portion of the scale were selected by the researcher. Through an examination of several previously devised instruments, 11 items were selected for adaptation in order to address the specific needs of this research. Adaptations were made to meet both the reading level as well as the specific need in this study for determining the perception of academic success as opposed to wide ranging perceptions of success.

The items were combined in a random ordering forming one complete questionnaire of 27 items. The responses to the combined questionnaires were made on a 5 point Likert scale; 1 = Strongly Disagree and 5 = Strongly Agree for ease of administration. Administration of these measures took place twice during the term; at the beginning and again at the end of the term. The posttests were administered one month prior to the students final English and Math exams.

The combined perceived control and perceived success scale (See Appendix G) was piloted for clarity with several academic upgrading students. As a result, minor wording changes were made. A total of 134 students enrolled

in three Math and five English classes at the College were administered the Perceptions of Academic Achievement Scale (PAAS) in order to obtain data for further reliability and validity testing. (See Appendix H for written information given to students and consent forms.) These results were used to conduct item and factor analyses as well as to determine the degree of internal consistency. Data from four of the above mentioned classes, one Math and three English, were also used for pretest information for Phase Two of the study while four classes from the above were re-administered the PAAS two weeks later in order to address test-retest reliability. These students had no further involvement in the study.

Validity was assessed in two major ways; one through a factor analysis and the other through substantive validity. Further in-depth description of the PAAS development and validation is presented in the Phase One section of the Results and Discussion chapter to follow.

Chapter V

RESULTS AND DISCUSSION

The results of both Phase One and Phase Two of this research will be discussed in this chapter. Phase One deals with both the substantive and quantitative analysis of the PAAS itself, which includes using a panel of expert judges, item analysis determining internal consistency, factor analysis, and test retest reliability. This is followed by a discussion of these results. Phase Two presents the findings of the study pertaining to the influence and effectiveness of a metacognitive strategies class for adult upgrading students in relation to perceptions of control and perceptions of success, as well as on performance on a standardized reading comprehension or mathematics assessment.

Phase One - Results

In order to assess the theoretical validity of the PAAS, a panel of four expert judges was selected from staff members and graduate students in the Department of Educational Psychology, at the University of Alberta. They were asked to provide feedback as to the accuracy of the two factor scales as set out by the researcher. These expert judges were independent of this research. The judges were informed that the items were thought to measure perception of control or perceptions of success. The judges, were asked to identify those items which could be categorized as either measuring perception of control or perception of success as well as, identify those items which did not fall into either of these two categories. For example, the following item was not identified by two of the judges as measuring either of the two categories and therefore deleted from further analysis. 'It would be desirable to have complete control over what happens in my English / Math course.' The initial PAAS included 27 items which was subsequently reduced to 22 items after the expert judges recommendations. As was described in the method section, this resulted in 11

items measuring perception of control and 11 items measuring perception of success.

A total of 134 students' scores on the PAAS were used to complete the quantitative analysis. These subjects were volunteers from a total of eight classes; three English and two Math classes as well as two English strategies and one Math strategies class. An item analysis was first run for each of the theoretical factors of perception of control and perception of success as well as, for the total score. Items were deleted if the 'Corrected Item-Total Correlation' was less than .200 on any of the three analyses. This resulted in the elimination of 2 items from the perception of control item pool, leaving 20 items in total.

A factor analysis was then run using the 20 remaining items. The results of this analysis produced 6 factors with eigenvalues greater than one. Utilizing a scree test and theory two factors identified for interpretation. An additional factor analysis using a varimax rotation was then run for interpreting the two factor solution. These weightings were then entered into a Procrusties. The purpose of the Procrusties was to assess the goodness of fit of the test items to the theoretical model. The final 14 items were selected on the basis that they had loadings of .35 or greater, on the appropriate theoretical factor.

A factor analysis using an oblimin rotation was then run confirming a clear two factor solution. The results left a total of 14 items; 9 items measuring perception of success and five items measuring perceptions of control. The first factor, Perception of Success, accounted for 31 percent of the total variance and Factor 2, Perception of Control, accounted for 10.7 percent of the total variance. The correlation of the two factors was .354. See Table 3 for items and their factor loadings from the final oblimin rotation. The internal consistency analysis of perception of control and perception of success yielded Cronbach Alphas of .647 and .808 respectively.

Table 3

Factor Item Loading for Perception of Success and Perception of Control

Item no.	Factor loading	Item
		Item loadings on Factor One (Perception of Success)
8	.868	I believe I am able to remember the information needed to do well on my tests.
15	.784	I believe I can take good enough notes in my classes to pass the exams.
21	.630	I handle unexpected problems successfully.
26	.612	I carry through with my responsibilities successfully.
23	.605	I believe I will do well this academic term.
11	.574	I believe I can solve math problems / write good essays.
13	.558	I believe I am as smart as most people in my classes.
2	.484	When I don't understand something, I believe with the right help I will be able to understand it.
5	.447	I am not very good at learning new skills.
		Item loadings on Factor Two (Perception of Control)
22	.771	My grades are basically determined by things beyond my control and there is little I can do to change that.
14	.689	There is little I can do about my performance at college.
3	.627	Much of what happens in my life is beyond my control.
6	.510	What matters most is that I can influence what happens to me.
24	.313	I have a lot of influence over things in my life.

Test retest reliability was evaluated utilizing four of the eight classes from the factor analysis portion of the study. There were 59 subjects who participated in both testings in this portion of the study. The students were tested two weeks apart. The correlation obtained between test and retest for perception of success was .703 and for perception of control was .591.

Phase One - Discussion

Phase One results lend both theoretical and statistical support for the two factors measuring perception of control and perception of success. With respect to substantive validity, 10 of the 14 Items were selected by all four expert judges while three of the four judges agreed on the remaining four items.

Structural aspects of construct validity were established through factorial analysis as two relatively distinct factors emerged, which were clearly interpretable as perception of success and perception of control. These two factors were also identified by the expert judges.

Reliability was assessed using two major approaches. One was to determine the internal consistency and the other was to determine test retest reliability. The instrument appears to have reasonable internal consistency with Cronbach Alphas of .808 .and 647 for perceptions of success and perception of control, respectively. The test retest reliability was .703 and .591 for perceptions of success and perception of control, respectively. Although these are not extremely high Salvia and Ysseldyke (1995) state that tests should have a reliability of .60 or higher for group data. The test retest reliabilities obtained here are somewhat greater than that obtained by Perry (unpublished data) in his study measuring perceptions of control of university students. These results suggest that the test has adequate test retest reliability particularly with respect to group and research applications. The above results provide some confidence in using the Perceptions of Academic Achievement Scale to

measure the constructs of perceptions of control and perceptions of success.

Phase Two - Results

The following question was investigated in Phase Two of the study: Does a metacognitive strategies class, for adult upgrading students, affect their perceptions of control and success, as well as performance on a standardized reading comprehension or mathematics assessment?

To increase the power of the study, the experimental and control groups from Phase One of this study were combined with those of Phase Two. There were no significant differences in the mean pretest scores for experimental or control groups on any of the variables. This was determined by running a one way ANOVA for each of the dependent variables by groups (See Appendix I). All of the Math and English groups were run together. For reading comprehension, the four English strategies classes were identified as the experimental group and two English control classes were identified as the control group. For mathematics, the two Math strategies classes were identified as the experimental group and one regular Math 10 class was identified as the control group. Mean scores and standard deviations for all measured variables for each class are reported in Table 4.

Table 4

Strategy and control class means and standard deviations for perception of control, perception of success and standard achievement scores for English and Math

		Perception of Control		Perception of Success		Standard Reading Scores	
English	n's	M	SD	M	SD	M	SD
Strategies							
1	10	20.25	3.91	33.17	6.34	640.78	112.80
2	10	17.92	3.06	29.42	7.27	610.00	71.43
3	14	16.92	3.26	33.69	5.53	599.29	49.38
4	5	16.40	2.04	30.93	3.09	568.67	68.16
Control							
1	19	19.92	3.48	34.23	4.87	625.28	81.45
2	12	18.15	3.51	32.54	6.25	609.58	68.31

		Perception of Control		Perception of Success		Standard Mathematics Scores	
Math	n's	M	SD	M	SD	M	SD
Strategies							
1	9	19.87	4.22	33.87	6.20	Cal. 566.14	58.22
						PS. 549.71	67.95
2	8	18.50	2.07	30.00	7.41	Cal. 534.88	62.22
						PS. 534.75	92.83
Control							
1	11	18.95	2.38	34.45	5.92	Ca. 581.00	70.68
						PS. 554.30	60.69

Analysis for the English - Experimental/Control Comparisons

When the four English strategies classes were collapsed into one experimental group and the two English control classes were collapsed into one control group, three separate two way ANOVA's utilizing pre and post as a repeated factor were carried out with reading comprehension, perception of success, and perception of control as the dependent variables. With respect to reading comprehension, no significant main effects were observed, $F(1, 57) = 2.92$, $p = .09$. However, a significant interaction was observed for groups by time for reading comprehension with $F(1, 57) = 4.4$, $p = 04$. The experimental reading group showed a greater change in reading comprehension scores as compared to the control group with mean scores changing from 600 to 635 for the experimental group and 612 to 608 for the control group. See Figure 3 for a visual representation of the interaction.

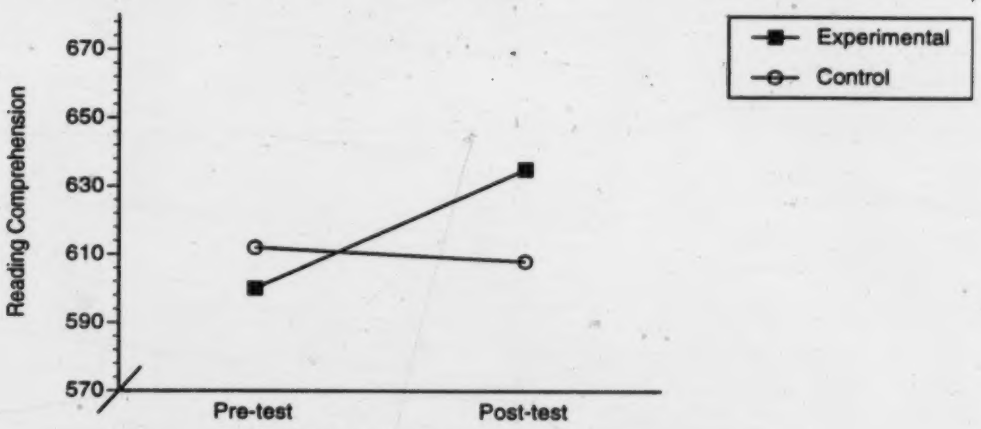

Figure 3. Changes in reading comprehension for experimental and control groups.

With respect to perception of success, a main effect was observed for time, $F(1, 58) = 6.22$, $p = .016$. Although the interaction for group by time did not

attain significance at p<.05 level, a distinct trend was evident, F(1, 58) = 3.52, p = .06. The results indicate the experimental group mean score changed from 31.71 to 34.95 and the control group mean score changed from 32.38 to 32.83 in their perception of success. See Figure 4 for a visual representation of the data.

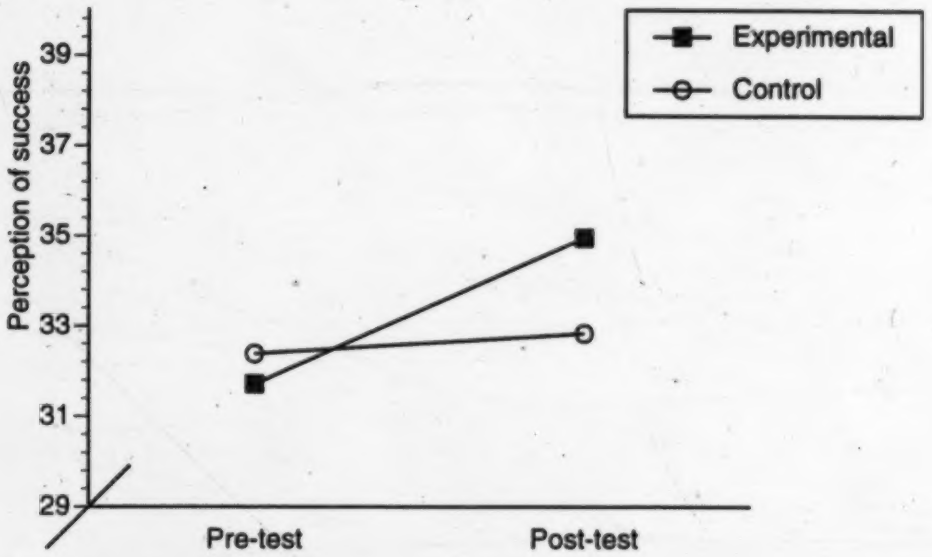

Figure 4. Changes in perception of success for experimental and control groups.

With respect to perception of control, a main effect was observed for time F(1, 57) = 4.36, p = .041. The interaction for groups by time did not attain significance at p < .05 level, F(1, 57) = 1.88, p =.175. The experimental group mean score changed from 17.79 to 19.47 and the control group mean score changed from 18.35 to 18.70. See Figure 5 for a visual representation of the data.

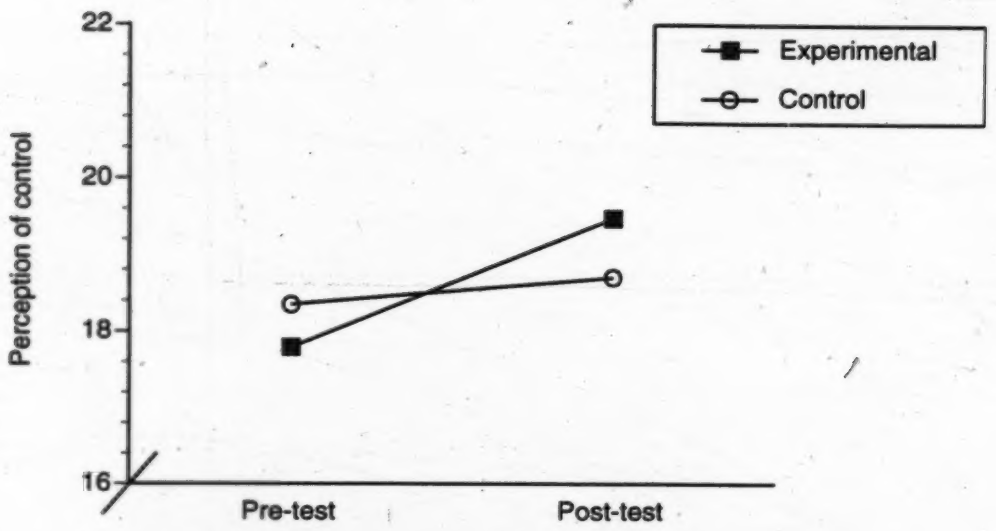

Figure 5. Changes in perception of control for experimental and control groups.

Analysis for the Math - Experimental/Control comparisons

When the two Math strategies classes were collapsed into one experimental group and compared to one Math control group, four separate two way analysis of variances utilizing pre and post as a repeated factor were carried out with math calculations, math problem solving, perception of success, and perception of control as the dependent variables. With respect to problem solving and calculations significant main effects for time were observed $F(1, 22) = 5.08$, $p = .035$ for problem solving, and $F(1, 22) = 7.76$, $p = .012$ for calculations. However, a significant interaction was not obtained for groups by time for either of the academic variables measured $F(1, 22) = .71$, $p = .41$ for problem solving and $F = .11$, $p = .738$ for calculations. The Math control group showed a somewhat greater change in problem solving and calculation scores than the experimental group with mean scores changing from 548 to 598; 547 to 570, respectively for problem solving and 584 to 621; 550 to 578, respectively for calculations. See Figure 6 and 7 for visual representations of the data.

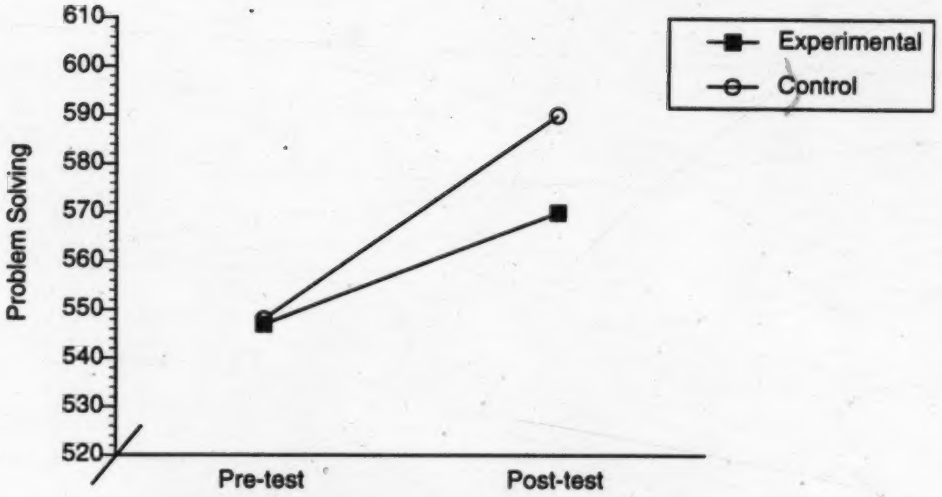

Figure 6. Changes in problem solving for experimental and control groups.

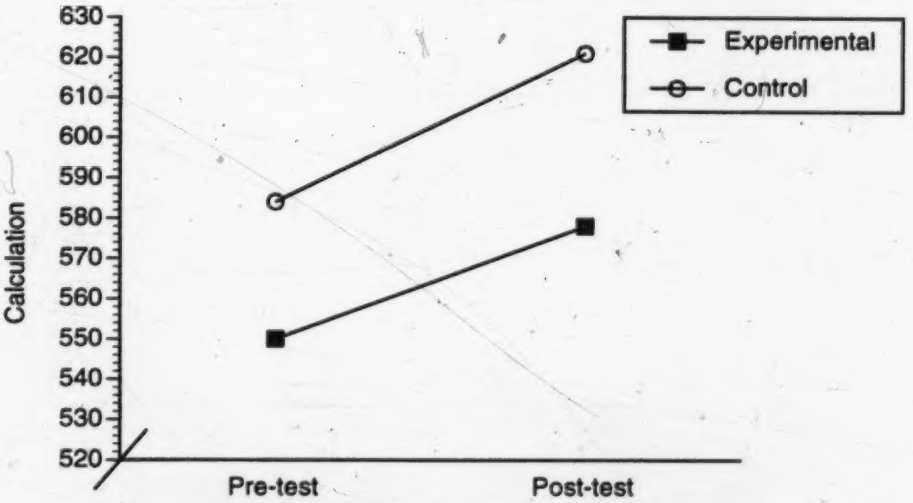

Figure 7. Changes in math calculations for experimental and control math groups.

With respect to perception of success a main effect was observed for time, $F(1, 25) = 8.84$, $p=.006$. Interaction for group by time did not attain

significance at the $p < .05$ level $F(1, 25) = .85$, $p = .366$. The results indicate the experimental group mean score changed from 32.29 to 36.47 and the control group mean score changed from 33.90 to 36.10 in their perception of success. See Figure 8 for a visual representation of the data.

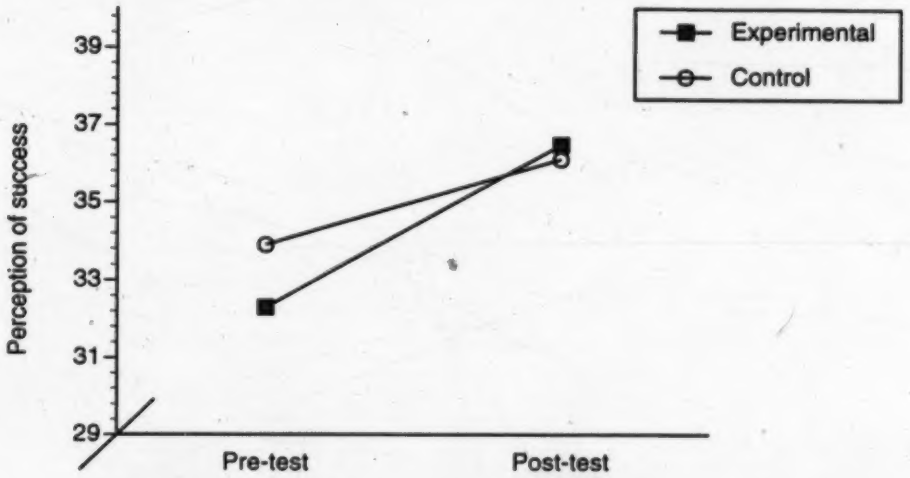

Figure 8. Changes in perception of success for experimental and control math groups.

With respect to perception of control neither main effects nor interaction effect were observed. Results of the ANOVA's were $F(1, 25) = .77$, $p = .389$, for the main effects and $F(1, 25) = .23$, $p = .635$, for the interaction effects. The experimental group mean score (19.00 to 20.24) changed slightly more than the control group (18.64 to 19.00) as depicted in Figure 9.

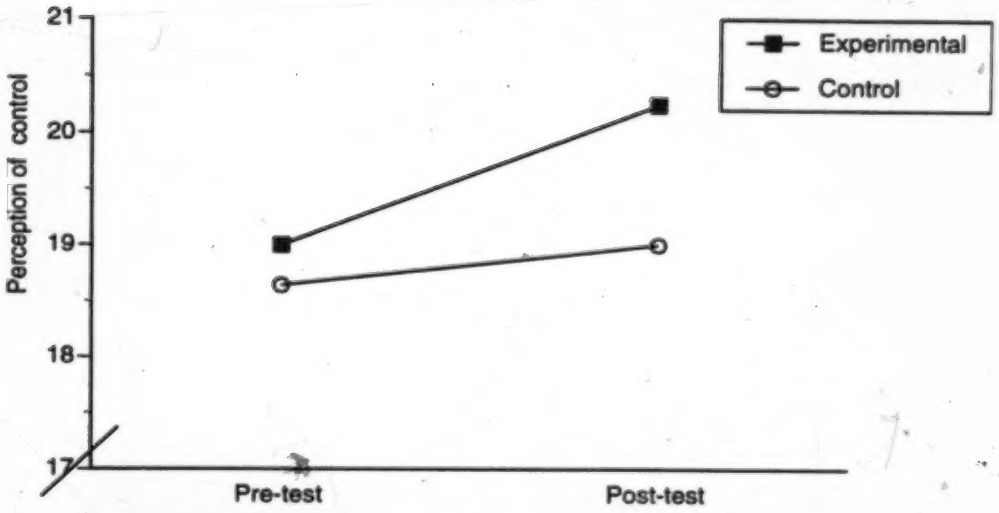

Figure 9. Changes in perception of control for experimental and control math groups.

Discussion

English - experimental/control comparison

As expected, the students who received the metacognitive and cognitive strategies classes improved on reading comprehension scores to a significantly greater extent than did the group of control students. Some students in the strategy class acknowledged this improvement, in their weekly summaries, prior to writing the standardized test. For example,

> For my questions on our book... I understand the questions better when I reword them. I've been getting them right, otherwise my answers would be wrong.
>
> After studying the strategies for reading multiple choice questions I applied them in practicing to answer the booklet exam. They help me a lot because my vocabulary is very poor.
>
> With each story that I did, I found myself reading them a lot faster and answering better answers that were suited to that story. I am using

my strategies more for reading stories and answering questions.

The other strategy I used was the R.L.S.R. strategy and found it did wonders for me on my Reading Comprehension test last Friday. I received my test back and was amazed on the mark, I received. I never thought I would get 76% what a shock. I will continue using this strategy in every subject I can in order to bring my average up.

Before I attended English Strategies, I had low marks on the tests for English. I always worried about that. But, now I am confident that I will pass reading exams and I am very happy I know methods to do well on reading comprehension... and organization.

These findings are consistent with studies carried out by Borkowski et al. (1989), Mulcahy et al. (1989), Paris and Jacobs (1984), and Pressley et al. (1985), in that metacognitive and cognitive strategies are effective in promoting reading comprehension for children. The findings appear to be generalizable to other content areas as other researchers (Biggs, 1988; Perry, 1994; Van Overwalle & Demetsenaere, 1990) have found college students' performance on final exams improves after metacognitive and cognitive strategy teaching.

Main effects for time were observed, in the positive direction, for both perception of success and perception of control. The mean score improved for both the experimental and control groups. This might suggest that both groups were feeling more confident that they would succeed. One would expect that good teachers would foster these feelings of success and control in any classroom, but this would be particularly important in settings where adults are returning to school for academic upgrading. Although a significant difference was not obtained between the experimental and control group, a distinct trend was evident for perception of success. The above statements from the students in the strategies class, would suggest that these students were indeed feeling

more successful. Comments from other strategies students indicated that they also attributed much of their success to strategy use, the teacher, and to the extra effort in being actively involved in their studies. A student's comment in the third month of classes supports this increase in perception of success;

> The strategies that I do not use now in the present I will use in my further courses and be glad to have this skill. I find that having these strategy skills have changed my attitude from negative to positive and gives me a lot more confidence to accomplish my goals.

With respect to perception of control, one student wrote this comment after a strategy lesson on stress management.

> During the past, I've been quite frustrated about class and on course changes, worried about funding and how to support myself in living arrangements. Before this class began, frustration was an everyday occurrence in my life. This week though I've handle my frustrations, or tried to, by simply asking myself one question, and that is 'can I change it or them?' I found when I answered my question, quite often my answer was no. If this was the case and I couldn't do anything to change the frustration or get rid of it, I'd deal with it when it happened.

Although it may, on first reading, appear that the student does not have control, in fact he is gaining much control. During observation at the beginning of the term, he would often get angry, yell at his teachers and class members, or walk out of the class. The teacher indicated that there were complaints about him to administration from both other teachers and peers. It is evident from the comments, above as well as researcher and teacher observations that this student had gained more control of his behavior. He was indeed gaining some control over his ability to deal with his frustration and in turn was able to attend more to what was being provided in his classes. Another student commented

that, "The stress management strategy works well in daily schedule, especially when you are overloaded with school work and problems in the family. By doing ..... helps solve things a lot better..." Yet another student wrote, "By taking the English Strategy course I find learning new and previous material to be a lot easier. I have modified the strategies a little to suit my needs." This modification is a strong indicator that this student is taking control over her learning. One student talks about how she has used one comprehension strategy in many of her daily readings and that she needs to practice all the time. She continues on to say "...This takes a lot of will-power and determination to keep trying and trying until I have a solid hold on the strategies." Although there was no clear statistical differences between the experimental and control groups in perception of control, the above anecdotal reports support the hypothesis that metacognitive strategies classes did improve these students' perceptions of control.

With regard to previous research, Reid and Borkowski (1987) found that when hyperactive children were involved in metacognitive and cognitive strategies training for reading (self-control and strategy plus attribution training), they showed increased self-control as well as greater strategy transfer and more effort-related attributions. The results of the present study would suggest that this also holds true, particularly in the reading area, for adults returning to school for academic upgrading. It is clear from the above comments that these students have also shown increasing self control, transfer of strategies and awareness of effort as an important factor in their learning.

Other researchers (Menec et al., 1994; Perry & Dickens, 1984; Relich, Debus & Walker, 1986) discuss perception of control as the belief that if students use strategies, they will do well in their academic endeavors. Each of these studies viewed the use of strategies in relation to other variables and

each found that students who received treatment or instruction regarding the use of strategies improved in achievement significantly over control or other treatment groups. Although the present study did not directly link strategy use to control as the previously mentioned studies did, it appears in the present study that the students made their own connections between strategy use and control without being explicitly taught. This is even more powerful, because if students are able to construct this perception on their own, they will be more likely to continue use of the strategies and possibly develop their own. The findings here may be viewed as supporting the results obtained in the above mentioned studies as well as being consistent with transformational learning within adult learning theory.

Math Experimental/Control Comparison

Main effects were observed for time but not for groups on calculations, problem solving, and perception of success. This would suggest that there was growth in these areas for both the experimental and the control groups as the group means increased over time on these variables. As mentioned in the English discussion section, this is a goal of the educational institution. Contrary to expectations, no significant differences were obtained for experimental and control groups on any of the variables measured.

The past research of Cardelle-Elawar (1992; 1995) and Montague (1992) found that metacognitive instruction was successful in improving low achievers' Math problem solving scores significantly in both small group and regular class settings. This research also addressed students' attitudes toward mathematics; however, these authors did not address attributions of success and control in their research.

There is very little research known to the author that specifically addresses metacognitive and cognitive strategies instruction in math with

respect to the adult population. Therefore, the following discussion relates to general interpretation of results of perceptions of success and perception of control as it pertains to math metacognitive and cognitive strategies instruction with adults.

The nature of Math and English themselves may contribute to the difference noted between the two areas being studied. Math is generally viewed as an area that is either scored correct or incorrect. Students view themselves as being either good or bad at it. One particular comment made by a student in the strategies group reflected this, "I'm no good at Math." This particular mind set may reflect the long-standing feelings of incompetence in Math. English, on the other hand, is a diverse area which includes talking, reading and writing which people do every day of their lives and will be successful on an intermittent if not regular basis. Students may view themselves as being better or worse in one aspect of English but generally do not see themselves as either being good or bad in the entire subject. This was supported by comments made by students in their weekly summary sheets, "I'm weak in vocabulary," or "I need work on my writing." This leaves some flexibility in one's perceptions and openness to learning in the area. Also in academic areas, students are graded on the many facets of English as opposed to getting one correct answer. The grading in English is somewhat more subjective than Math, as indicated above, which is essentially graded on correct verses incorrect answers.

Carver and Scheier (1990), note that prior experiences affect expectancies and these prior experiences can also affect how much control one will feel over his/her learning. In turn, these perceptions can and often do affect the effort one puts into learning. This particular view is also supported by Knowles (1970), in adult learning theory, as well as Kelly (1973) and Atkinson

and Birch (1978), in attributional theory. When these perceptions are negative, it may result in students decreasing the amount of effort they put forth, or actually giving up. Certainly, some of the reasons these students attended the strategies classes were that they felt less skilled in math or that they had been told they needed extra help in this area. Therefore, this "I'm no good at Math." mind set could reflect the long standing history of the above perceptions or behaviors. Also noted in the article was that the longer the mind set the longer it may take to change the individual's perceptions and behaviors. Therefore, it could be that the subjects being adults would require a longer intervention period in order to benefit from the metacognitive instruction both with respect to perceptions of success and control, as well as math achievement.

With respect to this particular study, one might expect that the learning curve for the experimental group would be much flatter than that of the control group as members of the experimental group would likely have this particular negative mind set to a greater extent. The expected rate of learning hypothetically might be two standard points over a one month period whereas the control group would be expected to have a learning rate of four standard points in the month. The experimental group may move three standard points and, therefore, not meet the control group in standard score change, but would show an increase at a rate (3/2) greater than would be expected (2/2). If this analogy is correct , it would mean that the students with a long standing perception of being 'no good at math' made relatively greater expected gains in all variables measured, which were indeed greater than the expected gain of the control group. The way to test for this would be to have a group with the same mind set randomly assigned to experimental and control groups.

Although the students in the class were informed of the course content and goals of the Math strategy class, it was evident from their logs as well as

observations that they continued to think that this class would also be used as a tutorial for the instructor to reteach the material they were taught in their regular math program. The students appeared to have a mind set that first you teach me how to do the item then you give me a strategy to do it, and that the strategy had only to do with math processing and not other areas of metacognition (planning, monitoring and evaluation). The students shared with the researcher verbally their frustration when they did not get this tutoring. This frustration may have interfered with the students openness to gain from the class both academically as well as to develop positive perceptions of success and control.

Summary

The results of Phase One of the study found both theoretical and statistical support for both perception of success and perception of control. Phase Two results were somewhat varied. In the area of English an interaction was found for reading comprehension with the experimental group making significantly greater gains over time than the control group. Positive trends were found for greater change in perceived success in the experimental group as compared to the controls. With respect to perception of control significant differences were not found. However, students' comments supported the notion that the strategies classes did have some effect in this area. No significant differences were noted between experimental and control groups for any of the variables measured in the Math area.

Chapter VI

CONCLUSIONS

This chapter provides an overview of the research as well as a summary of the findings. It also suggests educational and research implications for further study as well as the limitations of this study.

The purpose of the study was to investigate the influence and effectiveness of a metacognitive strategies class for adult up-grading students on their perceived success and perceived control in the academic setting, as well as on performance on a reading comprehension or math calculation and problem solving assessment.

The data were collected at a vocational college in a large city in Alberta over two semesters (one school year). During the first semester, data were collected to measure the reliability and validity of the PAAS as well as to gather data for the experimental portion of the assessment. Data from 134 students were collected to assess the reliability and validity of the PAAS. Data from the first semester experimental and control groups were amalgamated with those of the second semester to get a total of 28 people in the Math experimental (17) and control (11) groups and a total of 70 people in the English experimental (39) and control (31) groups.

The purpose of Phase One of the study was to assess the reliability and validity of the PAAS. Through expert judges, item analysis, factor analysis and correlational analysis, a 27 item Likert scale was condensed to a 14 item scale. There was both theoretical and statistical support for the two factors measuring perception of success and perception of control.

The purpose of Phase Two was to evaluate the effectiveness of a metacognitive strategies class in improving reading comprehension or math skills, perception of success and perception of control. Previous research has

shown that younger students' reading comprehension can be improved with strategy instruction. It has also shown that university students performance on Physiotherapy (Curtis, 1992), Economics, and Political Science (Van Overwalle & Metsenaere, 1990) exams improved when they were provided with information regarding their ability to control certain aspects of their learning (effort, time management and strategy use). The present research supported these findings in that students returning to school to obtain a high school education who received metacognitive and cognitive strategies instruction significantly improved their scores on a standardized reading comprehension test when compared to students who did not receive instruction. Although students improved their scores on standardized Math Calculation and Problem Solving skills in both the control and experimental groups, there was no interaction obtained with respect to group and time.

For the English section of the study, there was a trend for students who received the metacognitive and cognitive strategies instruction to show greater improvement over time for perception of success than those students who did not receive strategy instruction. For students in the Math section of the study both groups showed an improvement over time for perception of success; however, this was not observed for perception of control. It is the researcher's belief that one of the contributing factors to this lack of significance is due to the nature of the subject itself. Math is a stable, structured subject which is generally graded on a right or wrong basis. Students might tend to take that mind set when participating in the activity and be more resistant to change. Also, subjects in this class were mostly female and research (Ames, 1992) indicates that girls have been sociologically conditioned to believe they are not good in Math. Comments from two females in the class supported this notion. This may also account for the lack of change in perception of control.

Education Implications

The results of this study, showing significant change in reading comprehension provide support for offering a metacognitive strategies class for academic up-grading students. Further support for metacognitive strategies instruction in both the English and Math areas is provided by comments made by several students in their final summary and review sheets, which stated that they wished they had the strategies class when they entered the college. Taken together, the achievement data and comments suggest that these classes should be offered to students returning to school for academic up-grading. At present, Alberta Education does provide course credit to high school students who take a studies skills program. This option should also be available to all academic up-grading students, and possibly be made a requirement to ensure students are exposed to effective and efficient learning strategies. If the strategies and metacognitive thinking are to be generalized and transferred to other areas of adult student life, then each subject taught should include something in the curriculum that refers to strategy use and metacognitive thinking to aid in this generalization and transfer.

What does this mean for the strategies teacher and other teachers in these educational settings? Teachers will obviously have to become aware of strategies and teaching techniques which develop metacognitive thinking. They must also have what Braten (1993) calls teacher metacognition, being aware of the curriculum and how it is best taught. Braten also suggests that the setting be mastery or criterion referenced for students to first acquire and use their strategies. Then it is important to encourage students to become aware of their personal learning characteristics and those characteristics of the task in-order to adapt the strategy themselves (Mulcahy et al., 1988). This is supported by adult learning theory which suggests adult learners require some direct

teaching and then need the freedom to decide how they best learn.

Research Implications

In order to further clarify the effects of metacognitive and cognitive strategies instruction and thereby develop the opportunity of improving the education of adult upgrading students, the following questions which were raised by the present research need to be explored. The results of this research found that reading comprehension scores of the English strategies class differed significantly from the control group; this was not evident in the Math portion of the experiment with respect to problem solving and calculations. A number of questions might be asked regarding these results. Is there a difference in locus of control for students in Math and English classes and if one is present, is it malleable through metacognitive and cognitive strategies instruction? This same question can be asked with respect to affect (mood) generally. Yasutake and Bryan (1995) found that students with learning disabilities scored more negatively on an affective (mood) measure than did the control groups. Do students enrolled in Math and English strategies classes have different affect and if so, is it malleable through metacognitive and cognitive strategies instruction?

Comments from the students suggest that outside problems seemed to interfere with their learning. Some areas mentioned that caused some concern for the students were the demands of children, being a single parent and not having any family support in the city. If the government is going to be paying for these students' education and these circumstances are found to be a major cause for school drop out and failure, then it is necessary to further study this area and develop methods of assisting students with these other problems.

There were several students in each of the groups from different cultural backgrounds. Adding this variable to the study may have aided in the

interpretation, as Yan and Gaier (1994), when studying cross culture differences between American and Asian students, found that causal attributions for academic achievement were significantly different. American students attributed their success to ability and effort. However, they were less likely to attribute their failure to lack of effort. For the Asians on the other hand, effort or lack thereof, was identified as the reason for success or failure, respectively.

Limitations

1. A limitation of the study is that there were too few items measuring perception of control to get as reliable measure as one might desire. Also the items were more related to life situations than related to the academic environment.
2. The control groups for this study were regular academic classes. Although there were no significant differences in the dependent measures at the beginning of the term, it may be that the growth rates of the groups were different. Therefore, a control group whose members had been referred for strategy classes would have been a better match. This was not possible, however, in this study due to the ethical aspects of withholding instruction.
3. Although the experimental and control groups were collapsed over the two terms, the number of subjects was limited particularly for math. The results may have reached significance had numbers been greater.
4. There were a number of different cultures represented in both groups but a ratio was not identified. Research (Yan & Gaier, 1994) has found that there is a difference in perception of both control and success between various cultures. This could mean that, if there were a significant difference between the numbers represented for one group or another, this could affect the overall student scores. This would also hold true for students with English as a second language, with respect to academic scores.

5. Although the control and experimental groups had similar numbers of male and females, the results should be interpreted with caution, because a ratio of females to males was in the order of four to one. However, this is the general make-up of the students attending this vocational college. Research has found that there is a gender effect with respect to studies regarding Mathematics, both in children and college students (Petiprin & Johnson, 1991).

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APPENDIX A

Letter, time table, consent form, and information sheets for

English and Math Strategies Students

To: Students of A Vocational College English Strategies Class

Enclosed is the written information given to you regarding the research project being carried out along with your English Strategies class. As mentioned to you upon registering for the class, the college is interested in providing you with the best programming assistance possible. Therefore, they will be asking you for information regarding the class in order to see if the class is meeting its goals. This research project will also be used, in part, to fulfill the research component of Wendy Wiles' doctoral program. This research is being carried out to explore adult students' beliefs about control and success in their learning. The information will help us to understand adult student learning and provide appropriate instruction. At the end of the term the individual information provided should be helpful to you in understanding your own learning.

Approximately three and one half class periods will be used to gather the information needed. As well, information will be used from your Friday class summary sheets. (For breakdown of class time see attached sheet.)

All information collected in this study becomes the property of the researcher. At no time during the reporting of this research will your results be linked with your name. All information collected from you will be used for group analysis in this study. If you agree to participate in this study, it is understood that you may stop participating at any time by notifying the instructor or the researcher. This will not affect your mark in the class or how you will be treated.

Assessment results will not be reported to the college unless you request such a report and you provide written permission for me to share the information. Upon the completion of this research, I will forward a summary of the group results to you and to the college. At your request, you will be given the results of all your assessments after the completion of the metacognitive

strategies class. Appointments may be made so that information will be given to you in private the week following final exams or at your convenience.

If you are willing to participate in this study, please fill out the attached consent form, and information form and return them to your instructor as soon as possible. If you have further questions about this study, please contact me at 455-6736.

Sincerely,

Wendy Wiles, M.Ed.
Graduate Student at the University of A
Principal Investigator

Schedule of class time used for research

September 11. (approx. 30 min.)	You will have project explained to you again and will be asked to sign consent forms and fill out information sheets. (See attached sheets.)
September 13th. (approx. 10 min.)	You will be asked to complete a short vocabulary assessment. You will be asked to read several statements and state how you feel about them.
September 20th. (approx. 30 min.)	You will be asked to complete a reading comprehension assessment.
Two to three weeks before finals (approx. 60 min.) [Week of January 8th.	You will be asked to complete a short vocabulary assessment. You will be asked to read several statements and state how you feel about them. You will be asked to complete a reading comprehension assessment.

CONSENT FOR PARTICIPATION

I, _____ hereby consent to participate in a research project entitled "The effects of a Metacognitive Strategies Program on Perceived Control and Perceived Success for Adults returning to School for Academic Upgrading". I understand that such consent means that approximately 3 and one half classes will be used to carry out the research.

I understand that the results of the individual assessments will not be shared with the college except on my request, with written permission. I understand that I will receive information describing the group results of this research, and that I will contact Wendy Wiles if I wish to discuss individual results with her.

I also understand that participation in this project may be stopped at any time by my asking, or at the request of the investigator. Participation in this project and/or withdrawal from this project will not affect my course grade or the services I receive from the college.

I also understand that I will be asked for information regarding my past and present education, as well as information regarding age and gender. I also give my consent for the researcher to obtain my mid term and final grades from my English instructor, as well as monthly feedback on strategy use.

_____

Signature of Participant

_____

Signature of Witness.

_____

Date

INFORMATION SHEET

Name: _____

Address: _____

_____

Phone: _____

Birth Date: _____

Gender: _____

Time of Strategies Class: _____

Name of Strategies Instructor: _____

English class presently enrolled: _____

Name of English Instructor: _____

Family responsibilities: _____

_____

_____

_____

_____

How long have you been attending College? _____

Attendance: (to be obtained from the Strategies and English Instructors)

Strategy Class: _____

English Class: _____

To: Students of A Vocational College Math Strategies Class

Enclosed is the written information given to you regarding the research project being carried out along with your Math Strategies class. As mentioned to you upon registering for the class, the college is interested in providing you with the best programming assistance possible. Therefore, they will be asking you for information regarding the class in order to see if the class is meeting its goals. This research project will also be used, in part, to fulfill the research component of Wendy Wiles' doctoral program. This research is being carried out to explore adult students' beliefs about control and success in their learning. The information will help us to understand adult student learning and provide appropriate instruction. At the end of the term the individual information provided should be helpful to you in understanding your own learning.

Approximately three and one half class periods will be used to gather the information needed. As well, information will be used from your monthly summary sheets. (For breakdown of class time see attached sheet.)

All information collected in this study becomes the property of the researcher. At no time during the reporting of this research will your results be linked with your name. All information collected from you will be used for group analysis in this study. If you agree to participate in this study, it is understood that you may stop participating at any time by notifying the instructor or the researcher. This will not affect your mark in the class or how you will be treated.

Assessment results will not be reported to the college unless you request such a report and you provide written permission for me to share the information. Upon the completion of this research, I will forward a summary of the group results to you and to the college. At your request, you will be given the results of all your assessments after the completion of the metacognitive

strategies class. Appointments may be made so that information will be given to you in private the week following final exams or at your convenience.

If you are willing to participate in this study, please fill out the attached consent form, and information form and return them to your instructor as soon as possible. If you have further questions about this study, please contact me at 455-6736.

Sincerely,

Wendy Wiles, M.Ed.
Graduate Student at the University of A
Principal Investigator

Schedule of class time used for research

September 11. (approx. 30 min.)	You will have project explained to you again and will be asked to sign consent forms and fill out information sheets. (See attached sheets.)
September 13th. (approx. 10 min.)	You will be asked to complete a short math assessment. You will be asked to read several statements and state how you feel about them
September 20th. (approx. 30 min.)	You will be asked to complete a math assessment.
Two to three weeks before finals (approx. 60 min.) [Week of January 8th.	You will be asked to complete a short vocabulary assessment. You will be asked to read several statements and state how you feel about them. You will be asked to complete a math assessment.

CONSENT FOR PARTICIPATION

I, _____ hereby consent to participate in a research project entitled "The effects of a Metacognitive Strategies Program on Perceived Control and Perceived Success for Adults returning to School for Academic Upgrading". I understand that such consent means that approximately 3 and one half classes will be used to carry out the research.

I understand that the results of the individual assessments will not be shared with the college except on my request, with written permission. I understand that I will receive information describing the group results of this research, and that I will contact Wendy Wiles if I wish to discuss individual results with her.

I also understand that participation in this project may be stopped at any time by my asking, or at the request of the investigator. Participation in this project and/or withdrawal from this project will not affect my course grade or the services I receive from the college.

I also understand that I will be asked for information regarding my past and present education, as well as information regarding age and gender. I also give my consent for the researcher to obtain my mid term and final grades from my Math instructor, as well as monthly feedback on strategy use.

_____

Signature of Participant

_____

Signature of Witness

_____

Date

INFORMATION SHEET

Name: _____

Address: _____

_____

Phone: _____

Birth Date: _____

Gender: _____

Time of Strategies Class: _____

Name of Strategies Instructor: _____

Math class presently enrolled: _____

Name of Math Instructor: _____

Family responsibilities: _____

_____

_____

_____

_____

How long have you been attending College? _____

Attendance: (to be obtained from the Strategies and Math Instructors)

Strategy Class: _____

Math Class: _____

APPENDIX B

Letter, consent, and information sheet for students in the control groups

To: Students of A Vocational College (Control)

Enclosed is the written information given to you about the research project being carried out at the College regarding strategies classes. The college is interested in providing you with the best programming assistance possible. Therefore, they are carrying out research to assess the usefulness of the strategies classes. The college is looking for students who have yet to take the strategies class to participate as a control group. This research project will also be used, in part, to fulfill the research component of Wendy Wiles' doctoral program. This research is being carried out to explore adult students' beliefs about control and success in their learning. The information will help us to understand adult student learning and provide appropriate instruction. At the end of the term the individual information provided should be helpful to you in understanding your own learning.

While you are receiving extra help at the student support services you will be asked to fill out a questionnaire and complete either a reading or math assessment twice during this term. This will take approximately a total of 2 hours and will not be taken as part of your tutor time. As well, information regarding your age, gender, class enrollment, attendance, and marks are needed.

All information collected in this study becomes the property of the researcher. At no time during the reporting of this research will your results be linked with your name. All information collected from you will be used for group analysis in this study. If you agree to participate in this study, it is understood that you may stop participating at any time by notifying your tutor or the researcher. This will not affect how you will be treated.

Assessment results will not be reported to the college unless you request

such a report and you provide written permission for me to share the information. Upon the completion of this research, I will forward a summary of the group results to you and to the college. At your request, you will be given the results of all your assessments at the completion of the term. Appointments may be made so that information will be given to you in private the week following final exams or at your convenience.

If you are willing to participate in this study, please fill out the attached consent form, and information form and return them to your tutor as soon as possible. If you have further questions about this study, please contact me at 455-6736.

Sincerely,

Wendy Wiles, M.Ed.
Graduate Student at the University of A
Principal Investigator

CONSENT FOR PARTICIPATION

I, _____ hereby consent to participate in a research project entitled "The effects of a Metacognitive Strategies Program on Perceived Control and Perceived Success for Adults returning to School for Academic Upgrading". I understand that such consent means that approximately 2 hours will be used to carry out the research.

I understand that the results of the individual assessments will not be shared with the college except on my request, with written permission. I understand that I will receive information describing the group results of this research, and that I will contact Wendy Wiles if I wish to discuss individual results with her.

I also understand that participation in this project may be stopped at any time by my asking, or at the request of the investigator. Participation in this project and/or withdrawal from this project will not affect my course grades or the services I receive from the college.

I also understand that I will be asked for information regarding my past and present education, as well as information regarding age and gender. I also give my consent for the researcher to obtain my mid term and final grades from my English/Math instructor.

_____

Signature of Participant

_____

Signature of Witness

_____

Date

INFORMATION SHEET

Name: _____

Address: _____

_____

Phone: _____

Birth Date: _____

Gender: _____

English /Math class presently enrolled: _____

Name of English/Math Instructor: _____

Family responsibilities: _____

_____

_____

_____

_____

How long have you been attending College? _____

Attendance: (to be obtained from the English/Math Instructors)

English/Math Class: _____

APPENDIX C

Confirmation to Instructors, student and instructor record forms

To: Instructors of the Strategies classes at A Vocational College

Enclosed is a follow-up to our discussion regarding the times I will be observing in your classroom and the information I will need in order to carry out my research .

Observations: I will observe in the classroom and discuss observations as well as any concerns and questions you may have. Observations will address the strategies taught, the teaching method used and the Phase of the program. Observations will take place once a week for the first six weeks, once every two weeks for the next six weeks, and monthly for the remainder of the term. I will contact you prior to the observation day to make sure this is a convenient date.

Record keeping: You have been asked to keep a record of the strategies taught, the teaching method used and the Phase of the program that was covered. Also included in this record will be other instruction that may not be included in the above and comments as to what was successful and not so successful (See attached).

Students will also keep a record as to what strategies were taught in the class, if they tried them in the strategies class, the Math or English class, other classes or in other parts of their life. Also included will be a section for comments (See attached).

Record sheets will be picked up at the end of each month.

Thank you for your interest and cooperation.

Sincerely

Wendy Wiles

INSTRUCTOR RECORD FORM

STUDENT RECORD FORM

APPENDIX D

Canadian Achievement Survey Test for Adults (CAST)

Canadian Achievement Survey Test for Adults (CAST)

The Canadian Achievement Survey Test (CAST) (McGraw-Hill Ryerson (1992) provides a measure of skills in reading, language, mathematics and using reference materials. Subtests are further divided into reading vocabulary and comprehension, math computation and math concepts and application. The CAST is group administered and raw scores, as well as norm-referenced scores (percentile ranks, stanines, grade equivalents, and scale scores) are calculated.

Standardization

The CAST was normed on 16,000 Canadian students of different back grounds. A second study assessing students from Canadian community colleges and continuing and adult education programs was carried out. The purpose of this study was to provide data to enable professionals involved in adult student placement to compare a students achievement with one or more reference groups. (Numbers of participants for the second study was not provided in the technical information of the manual.)

Validity and Reliability

Correlations for number-correct frequency distributions were computed for the corresponding CAT and CAST levels. The reading vocabulary range was from 0.93 to 0.94, and reading comprehension range was from 0.84 to 0.90. The manual suggests that these correlations can be thought of as alternate form reliability coefficients and can be considered to be at an acceptable level.

Administration Procedure

In the pre-test phase, the CAST - locator test was administered by the classroom instructor prior to the reading comprehension or math skills assessment. This was scored in advance of the administration of the reading

comprehension or math subtest to ensure that the students were administered the assessment at an appropriate level. The reading comprehension or math subtest was administered to the appropriate students to provide a baseline to ascertain if corresponding academic performance was improved through metacognitive instruction. This process was repeated for the posttest phase, to assess reading or math levels after the metacognitive strategies course.

APPENDIX E

Perceived Control Scale 90 (Perry 1994) and the modified version.

Perceived Control Scale 90

Perry 1994

Strongly Disagree				Strongly Agree
1	2	3	4	5

1. I have a great deal of control over my academic performance in my Psychology course.
2. Much of what happens in my life is beyond my control.
3. It would be desirable to have complete control over what happens in my psychology course.
4. What matters most is that I can influence what happens to me.
5. I see myself as largely responsible for my performance throughout my college career.
6. I often feel that my life is determined by others.
7. I would rather study according to my own schedule than follow someone else's.
8. I have little interest in controlling how things unfold in my life.
9. There is little I can do about my performance in university.
10. Things that happen in my life are largely determined by me.
11. I enjoy having control over my life.
12. It is important to me to be able to control how well I do in my psychology course.
13. My grades are basically determined by things beyond my control and there is little I can do to change that.
14. I have a lot of influence over things in my life.
15. I prefer being told what to do rather than making my own decisions.
16. Being able to determine my academic performance in my university courses is important.

Perceived Control Scale 90

Perry 1994 - Modified

Strongly Disagree				Strongly Agree
1	2	3	4	5

1. I have a great deal of control over my academic performance in my English course.
2. Much of what happens in my life is beyond my control.
3. It would be desirable to have complete control over what happens in my English course.
4. What matters most is that I can influence what happens to me.
5. I see myself as largely responsible for my performance throughout my college career.
6. I often feel that my life is determined by others.
7. I would rather study according to my own schedule than follow someone else's.
8. I have little interest in controlling how things unfold in my life.
9. There is little I can do about my performance at College.
10. Things that happen in my life are largely determined by me.
11. I enjoy having control over my life.
12. It is important to me to be able to control how well I do in my English course.
13. My grades are basically determined by things beyond my control and there is little I can do to change that.
14. I have a lot of influence over things in my life.
15. I prefer being told what to do rather than making my own decisions.
16. Being able to determine my academic performance in my College courses is important.

APPENDIX F

Perceived Success Scale

Perceived Success

Strongly Disagree				Strongly Agree
1	2	3	4	5

1. When I don't understand something, I believe with the right help I will be able to understand it.
2. I am not very good at learning new skills.
3. I believe I am able to remember the information needed to do well on my tests.
4. I believe I can write good essays.
5. I believe I am as smart as most people in my classes.
6. I believe I can take good enough notes in my classes to pass the exams.
7. I do not believe I will be able to accomplish my goals.
8. I find my efforts to change situations I don't like are fruitless.
9. I handle unexpected problems successfully.
10. I believe I will do well this academic term.
11. I carry through with my responsibilities successfully.

APPENDIX G

Perceptions of Academic Achievement Scale (PAAS) for English and Math

Perceptions of Academic Achievement Scale

What is the Perceptions of Achievement about?

This questionnaire contains a number of questions about your feelings or beliefs about your academic achievement.

Remember there is no right way to feel or believe.

How to answer

You are asked to answer all 28 questions. There is no right or wrong answer. For each question you will have 5 choices. Choose one answer for each question.

Decide after reading the item if you

1. Strongly Disagree
2. Slightly Disagree
3. Neutral
4. Agree
5. Strongly Agree

Example

I enjoy reading my course texts.

If you do not like reading your texts at all you would mark the 1 on the computer sheet for this item.

Thank you for your cooperation.

Strongly Disagree				Strongly Agree
1	2	3	4	5

1. I have a great deal of control over my academic performance in my English course.
2. When I don't understand something, I believe with the right help I will be able to understand it.
3. Much of what happens in my life is beyond my control.
4. It would be desirable to have complete control over what happens in my English course.
5. I am not very good at learning new skills.
6. What matters most is that I can influence what happens to me.
7. I see myself as largely responsible for my performance throughout my college career.
8. I believe I am able to remember the information needed to do well on my tests.
9. I often feel that my life is determined by others.

10. I would rather study according to my own schedule than follow someone else's.
11. I believe I can write good essays.
12. I have little interest in controlling how things unfold in my life.
13. I believe I am as smart as most people in my classes.
14. There is little I can do about my performance at College.
15. I believe I can take good enough notes in my classes to pass the exams.
16. Things that happen in my life are largely determined by me.
17. I do not believe I will be able to accomplish my goals.
18. I enjoy having control over my life.
19. I find my efforts to change situations I don't like are useless.
20. It is important to me to be able to control how well I do in my English course.
21. I handle unexpected problems successfully.
22. My grades are basically determined by things beyond my control and there is little I can do to change that.
23. I believe I will do well this academic term.
24. I have a lot of influence over things in my life.
25. I prefer being told what to do rather than making my own decisions.
26. I carry through with my responsibilities successfully.
27. It is important to be able to determine my academic performance in my College courses.

28. If the goal of the English class is to learn reading comprehension skills and use them in this and other classes where appropriate, how important is it that you reach this goal?

Not Important	Somewhat Important	Relatively Important	Very Important	Extremely Important
1	2	3	4	5

Perceptions of Academic Achievement Scale

What is the Perceptions of Achievement about?

This questionnaire contains a number of questions about your feelings or beliefs about your academic achievement.

Remember there is no right way to feel or believe.

How to answer

You are asked to answer all 28 questions. There is no right or wrong answer. For each question you will have 5 choices. Choose one answer for each question.

Decide after reading the item if you

1. Strongly Disagree
2. Slightly Disagree
3. Neutral
4. Agree
5. Strongly Agree

Example

I enjoy reading my course texts.

If you do not like reading your texts at all you would mark the 1 on the computer sheet for this item.

Thank you for your cooperation.

Strongly Disagree				Strongly Agree
1	2	3	4	5

1. I have a great deal of control over my academic performance in my Math course.
2. When I don't understand something, I believe with the right help I will be able to understand it.
3. Much of what happens in my life is beyond my control.
4. It would be desirable to have complete control over what happens in my Math course.
5. I am not very good at learning new skills.
6. What matters most is that I can influence what happens to me.
7. I see myself as largely responsible for my performance throughout my college career.
8. I believe I am able to remember the information needed to do well on my tests.
9. I often feel that my life is determined by others.
10. I would rather study according to my own schedule than follow someone else's.

11. I believe I can solve math problems.
12. I have little interest in controlling how things unfold in my life.
13. I believe I am as smart as most people in my classes.
14. There is little I can do about my performance at College.
15. I believe I can take good enough notes in my classes to pass the exams.
16. Things that happen in my life are largely determined by me.
17. I do not believe I will be able to accomplish my goals.
18. I enjoy having control over my life.
19. I find my efforts to change situations I don't like are useless.
20. It is important to me to be able to control how well I do in my Math course.
21. I handle unexpected problems successfully.
22. My grades are basically determined by things beyond my control and there is little I can do to change that.
23. I believe I will do well this academic term.
24. I have a lot of influence over things in my life.
25. I prefer being told what to do rather than making my own decisions.
26. I carry through with my responsibilities successfully.
27. It is important to be able to determine my academic performance in my College courses.

28. If the goal of the math class is to learn math skills and use them in this and other classes where appropriate, how important is it that you reach this goal?

Not Important	Somewhat Important	Relatively Important	Very Important	Extremely Important
1	2	3	4	5

APPENDIX H

Letter consent and information forms for students in the reliability and validity portion of the study.

To: Students of A Vocational College

The College and Wendy Wiles, are carrying out a study to assess the usefulness of a questionnaire regarding adults' beliefs about their academic achievements. In order to this, the questionnaire must be given to a large number of students twice over a two week period. We are looking for students who are willing to fill out this questionnaire during class time and return it to their instructor.

You must understand that this will not give you any specific information and can be considered equivalent to a survey. If this questionnaire proves to be useful, at a later date the information will help us to understand adult student learning and provide appropriate instruction.

Approximately two twenty minute sessions of your class periods will be used to gather the information needed. All information collected in this study becomes the property of the researcher. At no time during the reporting of this research will your results be linked with your name. All information collected from you will be used for group analysis in this study. If you agree to participate in this study, it is understood that you may stop participating at any time by notifying the instructor or the researcher. This will not affect your mark in the class or how you will be treated.

Individual assessment results will not be reported to the college. Upon the completion of this research, I will forward a summary of the group results to your instructor and to the college.

If you are willing to participate in this study, please fill out the attached consent form, and information form and return them to your instructor as soon as possible. If you have further questions about this study, please contact me at 455-6736.

Sincerely,

Wendy Wiles, M.Ed.
Graduate Student at the University of A
Principal Investigator

CONSENT FOR PARTICIPATION

I, _____ hereby consent to participate in a research project entitled "Reliability and Validity of Perceptions of Academic Achievement for Adults returning to School for Academic Upgrading". I understand that such consent means that approximately two, 20 minutes session of class time will be used to carry out the research.

I understand that the results of the individual assessments will not be shared with anyone at anytime as this is used for group information only.

I also understand that participation in this project may be stopped at any time by my asking, or at the request of the investigator. Participation in this project and/or withdrawal from this project will not affect my course grade or the services I receive from the college.

I also understand that I will be asked for information regarding my past and present education, as well as information regarding age and gender.

_____

Signature of Participant

_____

Signature of Witness

_____

Date

INFORMATION SHEET

Name: _____

Address: _____

_____

Phone: _____

Birth Date: _____

Gender: _____

How long have you been attending College? _____

APPENDIX I

ANOVA tables for reading comprehension, math calculations, math problem solving, perception of control and success by groups.

ANOVA's for the dependent variables math calculations, math problem solving, reading comprehension, perception of control, perception of success and total PAAS score by groups to ensure there were no significant differences in the mean scores.

Math Calculations - Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	9706.3795	4853.1897	1.2120	.3122
Within Groups	29	116122.5893	4004.2272		
Total	31	125828.9687			

Math Problem Solving - Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	2	1831.2616	915.6308	.1730	.8420
Within Groups	29	153500.4571	5293.1192		
Total	31	155331.7188			

Reading Comprehension - Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	5	24740.9646	4948.1929	.8395	.5268
Within Groups	63	371338.9484	5894.2690		
Total	68	396079.9130			

Perception of Control - Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	8	142.6043	17.8255	1.5830	.1389
Within Groups	103	1159.8154	11.2603		
Total	111	1302.4196			

Perception of Success - Analysis of Variance

Source	D.F.	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	8	325.6962	40.7120	1.1405	.3429
Within Groups	103	3676.6409	35.6955		
Total	111	4002.3371			